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INSTRUCTIONS

FOR

SPECIAL HAND CRANK TABLE AND STEREO EQUIPPED TUBESTAND

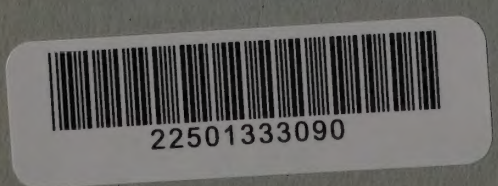
WHEN OPERATED WITH

STYLE #981475 SPECIAL CONTROL

AND

STYLE #980215 SINGLE TANK TRANSFORMER

WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY
2519 WILKENS AVENUE BALTIMORE, MARYLAND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WESTINGHOUSE ELECTRIC AND MANUFACTURING COMPANY

BALTIMORE, MARYLAND

ASSEMBLY, INSTALLATION AND OPERATION OF THE SPECIAL HAND CRANK TABLE AND STEREO EQUIPPED TUBESTAND WHEN OPERATED WITH THE S#981475 SPECIAL CONTROL AND SINGLE TANK S#980215 TRANSFORMER

These Instructions Are To Be Left With The Customer Upon Completion Of The Installation. Additional Copies May Be Had Upon Request.

Refer To Order No._____And The Above Style Numbers On All Communications Regarding This Equipment.

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GENERAL

Unpacking #16 Table

The following components comprise a complete shipment of the #16 Hand Crank Table.

- 1 - Rayproof Tube
- 2 - Cardboard Containers
- 1 - Fluoroscopic Tower
- 1 - Table Tub
- 1 - Undercarriage
- 5 - Large Counterweights
- 3 - Flat Counterweights
- 1 - Table Top
- 1 - Combination Shoulder - Foot Rest

Carefully unpack the following packages, making certain that no table components are discarded with the wrapping material.

The following components are packed within the two cardboard containers.

- 1 - Shutter Assembly
- 1 - Compression Device
- 1 - Cathode Socket
- 1 - Collar
- 1 - Jones Plug
- 4 - Cable Collars
- 4 - Levelling Plates
- 1 - Fluoroscopic Tower Lock
- 3 - Caution Bags (Hardware)
- 1 - Bucky Release Cord
- 2 - Porcelain Insulators

The Undercarriage is packed in a separate container along with eight Counterweights

- 5 - Heavy Rectangular Counterweights.
- 3 - Light Flat Counterweights

The table top container has included

- 1 - Table Top
- 4 - Angle Strips
- 2 - Chrome plated compression device rails

Unpacking #6 Tubestand

The following components comprise a complete shipment of the #6 Tubestand

- 6 - Small Circular Counterweights
- 1 - Carriage Costing
- 1 - Lower Bearing
- 1 - Tube arm
- 1 - Filter

1 - Tube Adaptor
1 - Rail With Scale
1 - Rail Without Scale
2 - End Legs
2 - Center Legs
2 - Rubber Bumpers
1 - Caution Bag (Hardware)
1 - Tubestand
5 - Cable Clamps

Carefully unpack the various packages in which the tubestand is shipped making certain that no tubestand components are discarded with the wrapping material.

Section 1

Description of Table (Ref. Figure C-5657)

1. Tub

The #16 table tub is shown as item 1 in fig. C-5657. The following components are mounted within the tub, bucky, bucky counterweight, fluoroscopic tower, rayproof tube, shutter assembly, main table counterweights, high tension reels and fluoroscopic tower counterweight.

2. Angle Strips

The angle strips for securing the table top to the table are shown as item 2 in fig. C-5657. In reality there exist two types of angle strips; two short strips and two long strips. The long strips are provided with extra holes along their sides to facilitate attachment of the compression device rails, item 3, to the sides of the table.

3. Compression Device Rails

The compression device rails are shown as item 3 in fig. C-5657. Their purpose is to provide a means of attaching the compression device to the table top. The spacers, item 4, which are used in securing the compression device rails to the sides of the table also serve as a means of attaching the removable footrest to the table when the table is in vertical use. There are fourteen positions in which the removable foot rest may be secured.

4. Compression Device Rail Spacers

The compression device rail spacers are shown as item 4 in fig. C-5657. Each rail requires fourteen spacers in order to be secured to the sides of the table. As outlined in paragraph three, the spacers also serve as a means of attaching the removable foot rest to the table when it is in a vertical position.

5. Fluoroscopic Screen Fork

The fluoroscopic screen fork is shown as item 5 in fig. C-5657. Within it is mounted the fluoroscopic screen assembly which is held in position by means of rails and spring pins, item 7.

The fork assembly has been accurately counter balanced at the factory so that it may be moved vertically through its

entire travel and remain in any desired position within this travel without the necessity of locking.

The shutter control knobs, item 13, are also mounted on the screen fork as are the screen rotation locks items 8 and 12.

6. Fluoroscopic Tower

The fluoroscopic tower is shown as item 6 in fig. C-5657. It may be moved along the length of the table as well as transversely. A lock handle has been provided to facilitate locking the tower into position; this is shown as item 9. Contained within the fluoroscopic tower are two sets of counterweights for the screen and fork assembly. The tower is secured by means of flexible cable to the main counterweight thereby counterbalancing it for operation in any position.

7. Fluoroscopic Screen Lock Pins

The screen lock pins are shown as item 7 in fig. C-5657. Their purpose is to lock the screen assembly into position once it has been inserted into the screen tracks. Removal of the screen assembly is accomplished in the following manner. First, pull the spring screen lock pins upward. This action will remove the lock pin from the screen. The pin is then rotated slightly so that the guide pin may not fall back into position. The lock pin is then released. The same procedure is repeated on the other pin. When this is finished the screen assembly may be withdrawn.

> Caution - It is essential that the screen fork be raised to its uppermost position before removal of the screen is attempted, otherwise the screen fork, becoming unbalanced due to the removal of the screen will jump to its uppermost position thereby causing damage to the fork mechanism.

8. Screen and Fork Rotation Lock

The screen and fork rotation lock is shown as item 8 in fig. C-5657. In normal operation the screen and fork assembly may be moved in a direction parallel to the table top. Special types of techniques may require the screen and fork assembly to be temporarily moved away from the table top in order to gain greater accessability to table bucky. For such techniques the screen and fork assembly may be temporarily moved aside in the following manner. First, the screen and fork safety lock is depressed, item 12. This is located directly behind the shutter control knob, item 13. With the safety lock depressed the screen and fork rotation lock handle, item 8, is pushed back. The screen and fork aim may now be pivoted so that it moves parallel to the table top about a point located on the fork mounting in the fluoroscopic tower. When the fluoroscopic screen has been swung about 15° in

this direction the screen rotation lock, located in front of the fork rotation lock, item 8, is turned in a clockwise direction and held there. The fluoroscopic screen and fork may now be swung downward, i.e. clockwise direction, until it is parallel with the fluoroscopic tower assembly. With the screen in this position the entire fork unit may be moved to the left, when viewing the table as shown in fig. C-5657.

To return the fluoroscopic screen back into its original position press the screen and fork rotation lock, item 8, to the right, this will release the screen and fork unit. Proceed to swing the screen until it is parallel to the fluoroscopic tower. At this point the screen and fork rotation lock will fall into its normal position. The screen rotation lock, located directly to the left of item 8 is now turned clockwise and held in position while the screen is swung about until it is parallel to the table top.

> Caution - The safety lock must always be operated before the screen and fork rotation lock handle is pushed backward. It is recommended if maximum accessability to the table is required that the screen be moved as outlined above, otherwise the tower lock handle, item 9, will interfere with screen rotation.

9. Fluoroscopic Tower Lock

The fluoroscopic tower lock handle is shown as item 9 in fig. C-5657. Its purpose is to secure the tower into position once it has been set. The lock may be operated by means of the handle shown as item 9, or by a front tower lock lever. This is shown in fig. C-5657, lying to the left and a little below the bucky lock handle, item 14. The front and rear locks operate in tandem, one may be used to lock the tower and the other to unlock it. Therefore, it is not necessary to operate the same lock for locking and unlocking purposes. It is recommended that the tower be locked into position when the fluoroscopic screen and fork assembly is manipulated as outlined in paragraph 8.

10. Shutter Control Cables.

The shutter remote control cables are shown as item 10 in fig. C-5657. By means of these cables it is possible to have full control over the fluoroscopic tube shutters from the remote fork arm position. The shutter cables actually run in flexible wound steel cables which prevent possible injury to the shutter control cables. The shutter control knobs operate in tandem and by means of connecting rods terminate in one pair of remote control cables.

11. Removable Fluoroscopic Screen

The fluoroscopic screen assembly is shown as item 11 in fig. C-5657. The screen frame assembly may be removed from the fork assembly by means of the procedure outlined in paragraph 7.

12. Screen and Fork Rotation Safety Lock

The screen and fork rotation safety lock is shown as item 12 in fig. C-5657. As outlined in paragraph 8, the safety lock, item 12, must be depressed before the screen and fork rotation lock becomes operable. Item 12 must always be depressed and held in this position, operating item 8 at the same time and swinging the screen to the left. Item 12 must be held until the screen and fork rotation locking pin has been removed from its locking position. At this point item 12 may be released.

Note - Never attempt to operate item 8 before depressing the safety lock, item 12.

13. Fluoroscopic Shutter Control Knobs

Two sets of fluoroscopic shutter control knobs have been provided on the arms of the fork assembly. They are shown as item 13, fig. C-5657. The fluoroscopic shutter control knobs are so connected that the two upper knobs operate in tandem. Similarly the two lower knobs.

A more detailed picture of the fluoroscopic shutter control assembly may be seen in figure C-5646.

A brief study of this figure will show that item 10 connects the two lower knobs through a lever arm, item 8. Similarly the two upper knobs are connected together by means of item 9 and lever arm, item 7.

The two flexible shutter control cables, item 6, may be seen connected to lever arms, item 7 and item 8.

Item 5 in figure C-5647 is the safety lock control cable which controls the operation of the screen-fork rotation lock, item 4.

14. Bucky Lock

Although the bucky has been provided with travel over the entire length of the table, it may be secured in any position, whether the table be in a horizontal or vertical position by means of the bucky lock mechanism, item 14 in fig. C-5657. The lock mechanism is of the friction type and is operable when the bucky lock lever arm is turned in a clockwise direction. The lock may be released by turning the lever

arm in a counterclockwise direction.

15. Bucky Timing Control

For bucky work it is desirable to have an adjustable speed bucky which should always set in accordance with the particular type of technique used. It is always recommended that the bucky speed, as indicated by the timing control knob, be set for a time interval slightly longer than the exposure timer setting. This procedure always insures a bucky in motion while the exposure is being taken. The timing knob is provided with the following marked time intervals, as indicated by item 15, fig. C-5657, 1/10, 1/6, 1/4, 2/5, 3/4, 1, 2, 3, 4, 6, 8, 10, 20 and 30 seconds.

The bucky time control selector should always be set prior to a bucky exposure. The bucky is "cocked" by means of the "setting" knob, item 16, fig. C-5657 and may be released either manually i.e. pulling item 21, or electrically be means of the bucky magnet release coil.

A brief outline of the electrical release will be given below. The bucky is normally provided with a magnetic release coil whose circuit is completed through a set of normally closed contacts contained within the bucky itself. These contacts are normally open unless the bucky is "cocked". Two other contacts are provided within the bucky for controlling x-ray exposures; these contacts are normally open unless the bucky is in motion. The two bucky magnet release wires and the exposure timing contact wires are brought out to the side of the table as the following leads, BM, BMC, and BC. Note that although we have two wires for the bucky release magnet and two wires for the timing contacts, the termination is made to a three wire circuit; terminal BMC being common to both the bucky magnet and the timing contact.

The bucky timing contacts are normally wired in series with the timing contacts of the exposure timer. The electrical circuits are so arranged that operation of the second trigger of the trigger switch applies potential to the BM, BMC terminals, which release the bucky. Once the bucky is released the BM circuit is opened. After the bucky has reached a pre-determined speed the BMC and BC contacts close. With BMC and BC closed the exposure is initiated. The exposure should always be terminated by means of the exposure timer and not the bucky timing contacts.

16. Bucky "Re-Set" Knob

As the bucky is not set automatically after the termination of a given exposure, it is necessary to reset it by means of the reset knob, shown as item 16 fig. C-5657. To reset the

bucky pull item 16 outward as far as it will go, then release it. Termination of a bucky exposure is always followed by a single stroke of a caution bell built within the bucky. The bell always sounds at the end of a bucky exposure, indicating that the bucky must be reset.

17. Bucky Pointer

To facilitate alignment of the bucky with the tubestand a pointer, item 17, fig. C-5657 has been provided. The pointer indicates on a scale built into the table. The table scale corresponds with the horizontal scale on the tubestand top rail. The scale built into the table reads from 1 to 54 inches. The scale on the tubestand is similarly marked. When the table is in a horizontal position and the left index of the tubestand carriage (as when viewed from the front table side,) set to 30 inches with the tube arm locked into its proper position, i.e. tube arm at 90 degrees with respect to the rail mount, The bucky index pointer must then be set to 30 inches if the bucky is to be used for a radiographic exposure.

It is essential that before the tubestand be secured to the floor, that careful alignment be maintained between the table and tubestand.

18. Angulation Scale

The angulation scale is shown as item 19 in figure C-5657. The scale has been provided to enable parallelism to be maintained between the table top and tube when the table is operated in positions other than horizontal.

An angulation scale has also been provided on the tubestand to facilitate this adjustment.

19. Angulation Pointer

For table operation in positions other than horizontal the angulation above or below a horizontal plane may easily be determined by reading the position of the angulation pointer with reference to the angulation scale. The angulation pointer is shown as item 20 in fig. C-5657.

20. Bucky Release Cord

As outlined in paragraph 15 the bucky may be released either electrically or mechanically. The electrical release was fully discussed in paragraph 15.

For applications where no auxiliary electrical release is provided the bucky may be released manually by pulling the bucky release cord, shown as item 21 in fig. C-5657.

All operating precautions outlined in paragraph 17 should be strictly adhered to.

21. Hand Crank Knob

The hand crank knob is shown as item 22 in figure C-5657. By means of a special automatic spring clutch mechanism housed within the crank drum the table may be placed in any position and left there without the necessity of other auxiliary brakes.

Caution - Do not tamper with any of the automatic clutch adjustments within the crank drum.

22. Bearing Block

The entire table is suspended on a set of bearing blocks shown as item 23 in fig. C-5657.

It is recommended that these bearing blocks be checked from time to time to see if they are sufficiently greased.

See paragraph on "Service Notes".

Caution - Never attempt to remove the bearing blocks when the table is in a vertical position.

23. Fluoroscopic Tower Counterweight Cable

The fluoroscopic tower counterweight cable is shown as item 1 in fig. C-5654. The cable has been installed at the factory and should need no further adjustments. If adjustments are necessary see paragraph on "Service Notes". The cable is normally run over two pulleys located at the head and foot ends of the table and terminates in the fluoroscopic carriage on one end and in the fluoroscopic tower counterweight at the other end. The other half of the fluoroscopic tower counterweight is run in a similar manner.

Caution - Adjustments of the counterweight cable should never be attempted with the table in a vertical position.

See paragraph on "Service Notes"

24. Fluoroscopic Tube Retaining Panel

The fluoroscopic rayproof tube, item 4, is normally mounted within two split clamps rigidly secured to the tube adapting panel, item 7, fig. C-5654. The tube adapting panel is in turn secured to the fluoroscopic tube retaining panel, item 2, fig. C-5654, by means of two wing bolts. The holes through which the wing bolts pass have been slotted to enable

adjustment of rayproof tube.

The retaining panel item 2, fig. C-5654, is part of the fluoroscopic shutter assembly.

25. Rayproof Tube

The rayproof tube assembly is shown as item 4 in fig. C-5654. It consists essentially of a tube, 2 split clamps, an anode reel (item 8, fig. C-5654) a cathode porcelain supporting insulator (item 5, fig. C-5654) and a cathode connector plug. The entire rayproof tube assembly is adjustable in order to enable centering of the x-ray beam on the fluoroscopic screen.

26. Cathode Porcelain Supporting Insulator

As the cathode connector is of the plug in type, support must be made of the cathode connector wires carried from the cathode reels, item 13, fig. C-5654, to the cathode socket. The cathode wires are secured to the supporting insulator thereby eliminating all strain from the cathode connector. The cathode supporting insulator is made of porcelain and is shown as item 5 in fig. C-5654.

27. Cathode Connector

A double focus type of x-ray tube has been provided under the table. The cathode end terminates in three prongs, common, small and large. To facilitate connecting the tube to the cathode high tension cable, reels have been provided, they are shown as item 13, fig. C-5654. The three cathode high tension reels terminate in a plug-in type of cathode connector which is polarized to prevent improper insertion into the tube.

As the connector is of the plug-in type strain relief is provided to prevent the connector from being withdrawn by virtue of the spring tension in the three cathode reels.

28. Adaptor Plate Retaining Wing bolts

The entire rayproof tube assembly, item 4, fig. C-5654 is held securely to rayproof tube retaining panel, item 2, fig. C-5654 by means of two adaptor plate retaining wing bolts. The rayproof tube assembly may be removed intact by removing the anode reel connection to anode cable, disconnecting the cathode porcelain supporting insulator and removing the cathode plug. It is recommended that once the rayproof tube has been properly aligned in relationship to the fluoroscopic screen that the wing bolts be securely tightened to prevent shift of the tube due to drag by the cable reels.

29. Anode Reel

The anode reel is permanently secured to the fluoroscopic rayproof tube assembly and is shown as item 8, fig. C-5654. The free end of the anode reel connects to the anode high tension cable in the upper section of the table as viewed in fig. C-5654.

A more detailed view of the anode high tension reel is shown in fig. C-5649. In this view the reel is shown as item 12, Note that the reel is secured to the narrow micarta strip which in turn is fastened to the lower end of the tube split clamps. A lug, item 10, fig. C-5649 has been provided to enable attachment of the anode reel to the anode inlet cable.

30. Bucky Inlet Cable

The bucky inlet cable is shown as item 10 in fig. C-5654. The cable is plugged into the bucky and serves as a flexible means of bringing out the BM, BMC, and BC terminals to the Jones male connector affixed to the side of the table.

The bucky inlet cable runs over a pulley after leaving the bucky, around the bucky counterweight as shown in fig. C-5654, and over a special pulley arrangement held taught by a spring mechanism.

In this manner all unnecessary slack is removed from the bucky inlet cable, which normally results when the bucky is moved over the length of the table.

31. Cathode Cable

The cathode high tension cable is shown as item 11, fig. C-5654. The cable is secured to the table by means of clamps shown as item 17, fig. C-5654. Termination of the cathode cable is made in three flexible leads with lugs marked "C", "S" and "L". The "C" stud is the common terminal for both the large and small focal spots. The "S" terminal is the small focal spot inlet, and the "L" terminal is the large focal spot inlet. It is essential that the three marked cathode terminals be properly wired to the three cathode high tension reels to insure proper selection of focal spots.

32. Cathode High Tension Insulator Posts

The two micarta posts shown as item 12, fig. C-5654 comprise the cathode high tension insulator posts. The posts provide a means of clamping the cathode high tension cable securely within the table. The cathode high tension reels, item 13, fig. C-5654 are screwed on to one side of the beveled post

tops. The other side, not clearly shown in fig. C-5654 is provided with a clamp for securing the cathode high tension cable sheath.

It is essential that the reels and cable sheath be rigidly held by the two cathode high tension posts, otherwise, the reels or sheath clamp may work loose due to reel strain. The cathode reels should therefore be inspected periodically.

33. Cathode High Tension Reels

To provide a flexible means of connecting the filament source of the rayproof to the cathode high tension cable three cathode reels, item 13, fig. C-5654 have been provided. As outlined in paragraph 32 the cathode high tension cable is secured to one side of the cathode high tension insulator posts. The connection to the cathode high tension reels is made by means of an acorn nut and lock washer to a stud protruding through the bottom of the reel mounting strip. With the cathode cable sheath in position and clamped securely by means of the sheath clamp, the three flexible high tension cable leads are passed underneath the three reels and electrically connected. It is most practical to use the following method in connecting the cathode high tension cable to the reels; let the left reel, when viewed as in fig. C-5654 be the "L" terminal; the center reel becoming "S" and the extreme right reel being "C".

> Note - The termination of the cathode high tension cable is made in three marked flexible leads; they are C, S and L.

34. Anode High Tension Cable

The anode high tension cable is shown as item 14 in fig. C-5654. The cable is secured to the sides of the table by means of clamps item 17, fig. C-5654. Mounted on the top narrow end of the table is a porcelain post. This item is not shown in fig. C-5654, but serves as a means of anchoring the high tension anode cable within the table. The flexible lead from the anode reel, item 8, fig. C-5654 and anode high tension inlet cable are joined at the porcelain post.

It is recommended that the porcelain post be inspected periodically and cleaned with lint free cloth. This procedure when carefully adhered to enables the high tension system to be trouble-free in its operation.

Section 2

Description of Tubestand

1. Rail Mount Leg (Center Right)

The center right rail mount leg is shown as Item 1 in Fig. C-5655. The upper and lower rails are secured to this leg by means of 3/8 X 16 machine screws. The upper rail is held with a 3/8 X 16 X 1¼ inch screw and the lower rail with a c/8 X 16 X 1½ screws.

2. Stereo Lock Knob.

The stereo lock knob is shown as Item 2 in Fig. C-5655. It is operated, locking the stereo release mechanism to the stereo rod, Item 6 Fig. C-5655 when the tubestand is to be used only for vertical stereo. When non-stereo operation of the tubestand is desired, the stereo lock knob should be left free.

3. Vertical Stereo Counterweights

Six vertical stereo counterweights have been provided to produce the proper amount of counterweighing for the tube arm when it is to be used for vertical stereo work. The counterweight is shown as Item 3 in Fig. C-5655. Depending on the type of tube, size and length of cone, and rate of stereo shift required, the proper number of weights are added to the counterweight retaining rod, shown as Item 4 in Fig. C-5655. The counterweights provided consist of five large units and one small unit. A central hole has been provided in the counterweights to facilitate quick addition or removal.

4. Counterweight Retaining Rod.

The counterweight retaining rod is shown as Item 4 in Fig. C-5655. Its purpose is to provide a quick and simple means of adding the desired counterweighing to the tube arm when it is used for vertical stereo work. In this manner proper vertical shift may be provided compensating for variables, such as size and length of cones, and relative weight differences in tubes.

5. Tubestand Column.

The main portion of tubestand consists of a column shown as Item 5 in Fig. C-5655. The column serves as a means of housing the necessary counterweights used in counterbalancing the tube arm and tube. The main column is provided with a vertical scale which enables quick determination of target to table top distance when the table is in a horizontal position. The target to table top distance is read from the top of the vertical carriage to the scale secured on the tubestand.

6. Stereo Rod.

The stereo rod is shown as Item 6 in Fig. C-5655. It is recommended that the stereo rod be loosely held in position when the tubestand is in operation. In this manner the stereo mechanism may be made to operate smoothly. Normal procedure when the tubestand is to be used for vertical stereo work is to tighten the stereo lock knob, Item 2, Fig. C-5655, set the stereo mechanism for the desired stereo shift and push the tube arm upwards until it locks into position. When the tubestand is to be used for non-stereo work, the stereo lock knob should be free.

7. Cable Rollers.

Cable rollers, Item 7, Fig. C-5655, have been provided to minimize cable drag and enable the tube arm to be used for horizontal stereo work. The rollers marked Item 7 in Fig. C-5655 are for the anode cable. A similar set to the left of Item 7 is for the cathode cable.

8. Tube Adaptor Retaining Screws.

The shock proof tube used on the #6 tubestand is first mounted on an adaptor plate which is in turn secured to the tube arm by means of two knurled thumb nuts shown as Item 8 in Fig. C-5655. The thumb nuts are removed first and the tube adapting plate placed in position. The thumb nuts are then replaced securing the tube adapting panel.

9. Tube Angulating Lock.

Item 9, Fig. C-5655 shows the tube angulating lock handle. A more detailed view of the angulating lock is shown as Item 4, Fig. C-5648. When turned in a clockwise direction, the tube angulating mechanism locks. Conversely counterclockwise rotation releases the mechanism. The degree of tube tilt is shown by a pointer on the angulating scale, Item 5, Fig. C-5648. It is possible to tilt the tube in either a clockwise or counterclockwise direction when viewing the tube arm as in Fig. C-5648.

10. Horizontal Stereo.

As outlined in Paragraph 7, Section 2, "Cable Rollers", the tube arm may be used for horizontal stereo. The horizontal stereo is set by means of two limit adjustments shown as Item 10 in Fig. C-5655. The maximum horizontal stereo obtainable is 3 inches. To adjust the tube arm for this stereo shift, proceed in the following manner. Set the tube so that the center line reference is opposite zero on the tube arm horizontal scale. Adjust the left limit knob, as viewed in Fig. C-5655, until it is centered about the tube center reference line.

Now the tube may be moved horizontally an inch and one half inches on either side of the zero point on the tube arm. The zero reference point on the tube arm corresponds to the center of the table. The maximum horizontal motion of the tube is nine inches, i.e. four and one half inches on each side of the zero reference point. The horizontal stereo adjustable limits also serve as a means of clamping the tube into position on the tube arm. The tube is clamped in the following manner. Set the tube reference line opposite the zero reference point on the tube arm. Move the right adjustable stop, Item 10 in Fig. C-5655 until it touches the tube holder. This will prevent the tube from moving to the right. Adjust the left stop until it also touches the tube holder. This locks the tube and prevents any horizontal shift along the tube arm. It is recommended that the right adjustable stop be loosened and moved to its extreme right position when the tubestand is to be used for horizontal stereo works.

11. Horizontal Carriage Lock.

The horizontal carriage lock handle is shown as item 11, Figure C-5655. By means of this lock, horizontal travel of the tubestand may be set to any desired value. Turning the handle in a direction to the left as shown in Fig. C-5655 secures the horizontal carriage to the top rail, Item 14, Fig. C-5655. Conversely turning the handle in a direction to the right as shown in Fig. C-5655 releases the lock mechanism and permits the tubestand to be moved along the railmount.

12. Horizontal Carriage.

The horizontal carriage is shown as Item 12 in Fig. C-5655. A lock is provided on the carriage to control horizontal travel. The purpose of the horizontal carriage is to provide a means of securely holding the tubestand in a rigid vertical position. The carriage is provided with a split clamp through which the vertical tubestand column is passed. The lower end of the vertical tubestand is held by means of the lower bearing, Item 16, Fig. C-5655. To insure ease in operation, the horizontal carriage is provided with four roller bearings which may be seen in Fig. C-5655. Two index nameplates have been mounted on the top surface of the horizontal carriage. The nameplates are accordingly marked "Horizontal" and "Vertical". The horizontal nameplate is mounted on the left end of the horizontal carriage as shown in Fig. C-5655. The vertical nameplate is mounted on the right end of the horizontal carriage. When the table is in a horizontal position the left index gives a reading of the distance from the "head end" of the table (narrow-end) to the center of the tube target. The scale on the left end of the top rail corresponds to the bucky scale on the table i.e. scale reading from 1 to 54 inches. When the

table is in a vertical position, the right index gives a reading of distance from the tube target (tube turned so that it is parallel to the table top) to the center of the bucky. The scale on the right end of the top rail, reading from 12 to 30 inches gives target to center of bucky distance when the table is in a vertical position.

13. Rubber Bumpers.

A rubber bumper, Item 13, Fig. C-5655 is provided at each end of the top rail. Its purpose is to prevent mechanical shock to the tube and tubestand when the horizontal carriage reaches the end of the rail travel.

14. Top Rail.

The top rail is shown as Item 14, Fig. C-5655. As outlined in Paragraph 11, Section 2, the top rail is provided with two special scales. The scale on the left when viewing the top rail as in Fig. C-5655 enables quick determination of alignment between the center of the bucky and the center of the tube. The scale on the right when viewing the top rail as in Fig. C-5655 enables target to center of bucky distance to be quickly determined when the table is in a vertical position. The two center legs are secured to the top rail by means of 3/8 X 16 X 1¼ inch bolts. The end legs are secured by means of ½ X 13 X 2 inch bolts.

15. End Leg.

The right end leg is shown as Item 15 in Fig. C-5655. The top and bottom rails are mounted within this leg and secured by means of ½ X 13 X 2 inch bolts.

16. Lower Bearing.

The lower bearing, Item 16, Fig. C-5655 serves as a means of rigidly holding the tubestand in place. It is provided with two roller bearings to give smooth operation and enables movement of the tubestand with a minimum of effort. The lower bearing has a split clamp into which the tubestand is seated. To facilitate proper operation of the tubestand, special care must be taken in adjusting the lower bearing. See - "Service Notes". and "Assembly"

17. Lower Rail.

The lower rail, Item 17, Fig. C-5655 provides a track over which lower bearing may ride smoothly. It is secured to the center legs by means of 3/8 X 16 X 1½ inch bolts and to the end legs by ½ X 13 X 2 inch bolts.

18. Vertical Stereo Selector.

The vertical stereo selector is shown as Item 4, Fig. C-5651. When vertical stereo work is to be performed by the tubestand, a vertical choice of the following shifts may be made 2, 2½, 3, 3½, 4, 4½, 5, 5½, 6, 6½ and 7 inches. For example, if a six inch stereo shift exposure is to be taken, assuming a target to bucky distance of 24 inches and a vertical carriage index distance of 36 inches, the vertical carriage lock, located to the left of the vertical stereo selector is released. The tube is moved downward vertically until the vertical carriage is set to 33 inches. (Ref. Fig. C-5651.) The stereo lock knob, Item 13, Fig. C-5651 is locked. The vertical stereo selector knob, Item 4, Fig. C-5651 is pushed in and turned until it is set to six inches. The entire tube arm is then moved upward until it locks into position automatically. The tubestand is now ready to take a six inch stereo shift exposure. The stereo lock knob,Item 13, Fig. C-5651 or Item 2, Fig. C-5655 must be locke in the desired second stereo position before the stereo selector is set and the tube arm moved.

19. Stereo Release Mechanism.

Once the tubestand is set for a stereo exposure, it may be released after the first exposure has been taken by one of two methods. It may be released mechanically by pulling a trip chord fastened to the stereo trip lever, Item 10, Fig. C-5651 or it may be released electrically by energizing a magnetic trip coil, Item 12, Fig. C-5651. When the magnetic type of stereo shift mechanism is employed, an auxilliary push button is operated from the control unit of the high tension generator. A standard female connector is wired to the control unit and plugged into the protruding male connector shown as Item 12, Fig. C-5651.

20. Rotation Lock.

A rotation lock is provided on the square tiebar, mounted parallel to the stereo rod, and located near the horizontal carriage. The purpose of the rotation lock is to enable fixation of the tubestand and prevent rotation when it is undesired. The tube arm is normally held perpendicularly with respect to the tube rail by means of a tactile indicator shown in Fig. C-5651 as being to the left of the horizontal carriage lock handle.

21. Tube arm Rotation Lock.

With the tubestand rotation lock released, and the tube arm perpendicular to the rail mount, the tube may be rotated so that it may be made parallel to the table top regardless of the position of the latter, i.e. the tube may be rotated 90 degrees. To rotate the tube, a convenient rotation lock is

provided. This is shown as Item 1, in Fig. C-5648. A tube rotation index scale is provided on the vertical carriage to indicate the actual tube rotation in degrees. By means of the rotation index on the vertical carriage and the anulation index on the side of the table parallelism may always be easily obtained by setting the tube arm rotation index to agree with the table angulation index.

22. Filter and Coneholder.

A track is provided in the tube holder to facilitate addition of filters and cones to the tube. A spring catch, Item 3, Fig. C-5648 must be sprung back to enable insertion of the filter or cone.

Section 3

Terminal Identification

(Ref. Dwg. 7709755.)

1. Foot Switch.

A female receptacle is provided in the lower left hand corner of the front leg. The female receptacle is wired to an eight prong Jones connector located on the rear table leg. A special five wire cable is provided to make all connections between the table and control. The cable is equipped with an eight prong Jones female connector. To connect the foot switch to the foot switch to the control unit, plug the five wire interconnecting cable into the side of the table. Connect the two "FS" cable terminals to similarly marked control terminals.

2. Bucky

The bucky is connected to Jones plug terminals 5,6 and 7.
The white, BMC, wire connects to Jones plug terminal 6.
The green, BC, wire connects to Jones plug terminal 5.
The balck, BM, wire connects to Jones plug terminal 7.
The table bucky is provided with a magnetic release coil whose circuit is completed through a set of normally closed contacts contained within the bucky itself. These contacts are normally open unless the bucky is "cocked". Two other contacts are provided within the bucky for controlling X-ray exposures. These contacts are normally open unless the bucky timing contacts are normally wired in series with the timing contacts of the exposure timer. The electrical contacts are so arranged that operation of the second trigger of the trigger switch applies potential to the BM, BMC terminals which release the bucky. Once the bucky is released, the BM circuit is opened. The bucky timing contacts BC, BMC close after the bucky has reached a predetermined speed. With BC and BMC closed, the exposure is initiated. (Note)- The exposure should always be terminated by means of the exposure timer and not the timing contacts. Connection to the control is made by means of the three remaining wires of the five conductor table to control interconnecting cable. Cable terminals BM, BMC and BC are connected to similarly marked control terminals.

3. Stereo Release.

The magnetic vertical stereo shift release mechanism is connected to the control unit in the following manner. A female connector, twenty feet of rubber covered cable, a push button and a push button hook are provided to make the above connection.

1. The rubber covered wire is stipped at one end and secured to the female connector in the usual manner.

2. The female connector is plugged into the magnetic release unit on the tubestand.

3. The other end of the twenty foot cable is also stripped and prepared for wiring into the control.

4. Wire one end of this cable to control stud SM-1.

5. Wire one end of the stereo release push button to control Stud SM-2.

6. Connect the other end of the magnetic release interconnecting cable to the remaining lead of the push button. Solder and properly tape this junction.

The stereo release push button will be operable only when the control main switch is on. Caution. Do not attempt to make any of the above wiring additions without first turning off the control main switch.

Section 4

Table Assembly

The procedure outlined below should be strickly adhered to. The step by step method, if completely followed will enable assembly of the table in the most efficient and direct manner.

1. Undercarriage.

Place the undercarriage, Item 1, Fig. C-5645, in the desired position. The undercarriage should be located so that the crank mechanism, Item 3, Fig. C-5645 is towards the front. If the tubestand and transformer are to be located in such a position, where final placing of the high tension transformer is impossible, it is recommended that the transformer be located near the rear leg of the undercarriage as shown in Fig. C-5645, before the undercarriage is positioned. Special levelling pads are provided for insertion under the four corners of the undercarriage. Levelling screws are provided within the table legs to enable proper levelling of the table.

2. Table Tub.

Handling and final positioning of the table tub will require the assistance of at least 4 men. The following procedure should be carefully followed.

a. Carry the tub over to the table undercarriage. It will be noted that one side of the table tub crate is made of heavy lumber, securely bolted to the table tub.

b. Position the tub so that the bottom packing boards of the foot end lie approximately one and one half or two inches from the right side of the front undercarriage leg as viewed in Fig. C-5657.

c. Place a piece of four by four lumber, approximately forty inches long, under the foot end of the bottom packing boards. Make certain that the piece of four by four is flush with the end of the bottom packing board.

d. Remove all packing boards from the tub with the exception of the heavy bottom pieces.

e. Remove the split bearing retaining screws (Item 23, Fig. C-5657)

f. Remove the top halves of the split bearings (Item 23, Fig. C-5657)

g. Raise the head (narrow) end of the tub slowly until it is in a vertical position.

h. Swing the head end of the tub downward, so that it passes between the two undercarriage legs.

Note - Make certain the four X four piece of lumber does not slip as the tub is lowered into position.

i. As the tub pivot pins near the split bearing block on the undercarriage, check for alignment of the drive gear and tub gear, Items 16 and 15 Fig. C-5654. The crank mechanism, Item 22, Fig. C-5657 should be rotated to insure proper gear meshing.

j. When the tub has been lowered sufficiently for the pivot pins to rest in the split bearing blocks, replace the upper halves of the bearings and their retaining screws.

Caution.- Do not release the tub until the upper sections of the bearings have been replaced and the gear mechanism properly meshed.

3. Main Counterweights.

a. When the tub has been properly secured within the undercarriage turn the cranking mechanism, Item 22, Fig. C-5657 until the tub lies in a vertical position.

b. By means of a suitable wrench, remove the heavy bolts holding the wooden base to the top of the tub.

c. Five main counterweights, numbered one to five are inserted into table tub in the following manner.

d. Remove the main counterweight shipping strap.

e. Insert the counterweights one at a time into their respective positions.

Note - Each counterweight is numbered. A corresponding number is marked on the tub to insure proper table balance (See Item 13, Fig. C-5652)

f. Secure each counterweight by means of a proper bolt and lockwasher. (See lower section of Fig. C-5654)

g. The three flat counterweights are placed under the foot end table top flange.

h. Secure the three flat counterweights by means of proper flat head screws.

i. Remove the wire tying the horizontal carriage and bucky to the head end of the table.

Caution - Before turning the table to a horizontal position, make certain the horizontal carriage lock is in its locked position. (See Paragraph 9, Section 1.)

4. Fluoroscopic Tower

a. Before inserting the fluoroscopic tower into the horizontal carriage, remove the fluoroscopic tower stop. This is shown as Item 28, Fig. C-5656.

b. Carefully insert the tracks of the fluoroscopic tower, Item 3, Fig. C-5658, into the horizontal carriage roller bearings, Item 14, Fig. C-5656. When the tower is first inserted, make certain that the shutter control cables are clear and do not become entangled with the horizontal carriage. The fluoroscopic tower tracks must also pass between the jaws of a "pincer type" brake. The pincer brake is shown to the left of Item 5, Fig. C-5654.

c. When the tower is properly inserted, replace the tower stop, Item 28, Fig. C-5656.

d. Assemble the fluoroscopic tower lock handle, Item 18, Fig. C-5656, on the horizontal carriage by means of two bolts, Item 16, Fig. C-5656.

5. Bucky Cord.

The bucky cord, Item 24, Fig. C-5656, should be inserted through the insulator bushing into the connecting box, Item 27, Fig. C-5656. The cord should be wired to the eight prong Jones male connector in the following manner.

a. Solder the white, BMC, lead to Jones connector terminal 6.

b. Solder the green, BC, lead to Jones connector terminal 5.

c. Solder the black, BM, lead to Jones connector terminal 7. (See Dwg. 7709755 for Jones connector terminal identification.)

d. The table should be operated from horizontal to vertical position in order to determine the proper amount of slack needed in the bucky cable.

e. When the required slack has been determined, wrap a sufficient length of friction tape around the bucky cable to prevent subsequent damage to the bucky soldered connections that may result from cable motion.

Caution - In step "D" of this paragraph, it was recommended that the table be shifted from its horizontal position to a vertical position. Since the fluoroscopic screen has not as yet been inserted into the fluoroscopic screen fork there exists a difference in counterbalance between the tower counterweight and the tower assembly. It is recommended that the fluoroscopic tower be moved to the head end of the table and locked into position by means of the fluoroscopic tower lock handle. (Ref. Par. 9, Section 1.) Failure to observe this precautionary measure may result in damage to the horizontal carriage casting or the horizontal travel stops.

6. Fluoroscopic Shutter Assembly.

a. With the table in a horizontal position, remove three machine screws holding the protective bottom covering at the foot end of the table.

Note - The fluoroscopic tower should be left locked at the head end of the table.

b. Adjust the table so that it lies in a vertical position. As the table is rotated, bear against the protective bottom covering to prevent any possible binding between the bottom and the undercarriage.

c. When the table is in a vertical position, remove the remaining three screws holding the protective bottom covering.

d. Lower the fluoroscopic tower, lock it and secure the fluoroscopic shutter assembly as shown in Fig. C-5654.

1. In positioning the shutter assembly, note that the two shutter control arms lie in a downward position.

2. The shutter assembly is held by three round head and one flat head machine screws.

3. Figure C-5658 shows the entire shutter unit.

4. Item 1 secures the fluoroscopic tube retaining plate and fluoroscopic cone assembly to the shutter base casting.

5. Item 2, wing bolt, is provided on the fluoroscopic tube retaining plate to enable the fluoroscopic tube assembly, Item 4, Fig. C-5654.

6. Item 3 is the fluoroscopic tower rail unit.

7. Item 4 is the fluoroscopic cone assembly.

8. Item 5 is a spacer for maintaining fixed tube target to table top distance.

9. Item 6 is the shutter lever arm.

10. Item 7 is the shutter control cable attachment spacer.

11. Item 8 is another wing bolt provided to secure the fluoroscopic tube assembly.

12. Item 9 is the one half millimeter fluoroscopic tube aluminum filter.

13. Item 10 is the shutter control cable retaining screw.

14. Item 11 is the other shutter lever arm.

15. Item 12 is another shutter control cable attachment spacer.

e. After securing the fluoroscopic shutter assembly to the horizontal carriage, assemble the shutter control cables in the following manner. (Ref. Fig. C-5658)

1. Loosen the shutter cable retaining screw. (Item 10, Fig. C-5658).

2. Pass the shutter control cable under the retaining washer as shown by Item 10, Fig. C-5658.

3. Remove the binding head screw from the cable attachment spacer. (Item 7, Fig. C-5658)

4. Make certain that the lower binding head screw on the cable attachment spacer is properly secured by means of the small Allen screw. To test for this, rotate the attachment spacer. Free movement between the cable and the spacer should exist.

5. Insert the cable attachment spacer into the shutter lever arm, Item 6, Fig. C-5658.

6. Secure the cable attachment spacer by means of the binding head screw removed in step 3.

7. Remove the small binding head screw from the other cable attachment spacer (Item 12, Fig. C-5658)

8. Repeat the test made in step 4.

9. Insert the cable attachment spacer, Item 12, Fig. C-5658, into the shutter lever arm, Item 11, Fig. C-5658.

10. Secure the cable attachment spacer by means of the binding head screw removed in step 7. This procedure completes assembly of the shutter control cables and shutter.

7. Rayproof Tube Assembly.

a. Remove the rayproof tube from its shipping carton.

b. Check and make certain whether the small light proof shield is inserted into the rayproof tube window.

c. The rayproof tube is assembled in the following manner. (Ref. Fig. C-5649.)

1. Remove two screws from each of the split clamps (Items 4 and 8, Fig. C-5649.)

2. Remove the two upper halves of the split clamps (Items 5 and 9, Fig. C-5649.)

3. Insert the rayproof tube into the lower half of the clamp. It will be noted that both halves of the tube clamp are provided with four small rubber bumpers. Make certain all bumpers are in position before reassembly of the tube clamp.

4. The rectangular window of the rayproof tube must project into the small micarta lead lined ring secured to the tube adapting panel.

5. Roughly center the rayproof tube with respect to the small circular lead lined micarta ring.

6. Replace the two upper halves of the split clamps, Items 5 and 9, Fig. C-5649.

7. Replace the four clamp retaining screws.

8. Tighten the split clamps sufficiently to hold the tube in a vertical position.

9. Secure the cathode porcelain supporting insulator to the lower half of the rayproof tube clamp, Item 4, Fig. C-5649. The cathode porcelain supporting insulator is shown as Item 1, Fig. C-5649.

10. Loosen the small anode connector knurled nut and place the flexible anode connecting lead into position under this nut. Secure the nut after performing this operation.

11. Check the small flat head machine screws holding the anode reel supporting strip. Make certain they are secured.

12. Check the anode reel, Item 12, Fig. C-5649. Make certain it is properly secured.

The completely assembled rayproof tube, ready for attachment to the tube retaining panel, Item 2, Fig. C-5654, is shown in Fig. C-5649.

8. Assembly Of The Rayproof Tube On To The Fluoroscopic Tower Undercarriage.

a. With the table in a vertical position, as shown in Fig. C-5654, remove the two wing nuts, Item 6, Fig. C-5654.

b. Insert the complete rayproof tube assembly as shown in Fig. C-5654.

c. Replace the two wing nuts removed in step "a" of this paragraph.

9. Assembly of Anode Cable in Table.

The anode cable is differentiated from the cathode cable in that the former has one conductor. The cable is assembled within the table in the following manner. (Ref. Dwg. 3A-1655.)

a. Secure the upper end of the anode cable, i.e. end without large nut, to the head end of the table by means of cable clamp, Item 10, Dwg. 3A-1655.

b. Ground the cable outer sheath by means of the special wire attached to the anode cable.

Caution - Failure to ground the high tension cable may result in a broken down cable.

c. Secure the isolantite insulator, Item 19, as shown by means of a $\frac{1}{4}$ X 20 machine screw. A hole is provided at the head end of the table to secure the isolantite insulator.

d. Run the anode high tension cable along the left side of the table as viewed from the rear.

e. Secure the cable by means of the clamps provided. (Item 1, Dwg. 3A-1655.)

f. The final turn is the high tension cable before it emerges from the table may be seen in Fig. C-5654.

g. Insert the cable into the cable clamp, Item 11, Fig. C-5652.

h. Assemble the split cable clamps as shown by Item 11, Fig. C-5652. When the anode cable is initially installed, allow enough cable slack to permit the table to be adjusted to its horizontal position without making too sharp a bend in the cable. The cable clamps should be properly secured after the proper cable slack has been determined.

i. Connect the single conductor emerging from the high tension anode cable sheath and the anode reel interconnecting lead to the isolantite insulator, Item 19, Dwg. 3A-1655.

Note - See Fig. C-5654 for further details regarding the anode high tension cable.

10. Cathode High Tension Cable Assembly.

The cathode cable is made of three conductors and is shown as Item 1, Fig. C-5652. The cable should be connected in the following manner.

a. Loosen the two flat head machine screws holding the cathode sheath clamp into position.

b. Insert the cathode insulator sheath through the clamp and secure it.

c. Ground the sheath of the cathode high tension cable by means of the special ground wire attached. The ground wire is shown in position in the lower center of Fig. C-5652.

Caution - Failure to properly ground the cable outer sheath may result in a broken down high tension cable.

d. Clamping details of the cathode high tension cable are shown by Item 11, Fig. C-5654.

e. Insert the cathode high tension cable into its clamp, Item 1, Fig. C-5652.

f. Assemble the split cable clamps as shown by Item 1, Fig. C-5652.

When the cathode cable is initially installed, allow enough cable slack to permit the table to be adjusted to its horizontal position without making too sharp a bend in the cable. The cable clamps should be properly secured after the proper cable slack has been determined.

g. The three flexible cathode high tension cable connectors should be wired in the following manner. Let the left reel, when viewed as in Fig. C-5654, be the "L" terminal; the center reel becoming "S" and the extreme right reel being "C".

11. Cathode Socket Assembly.

The cathode socket, Item 6, Fig. C-5654 is wired to the high tension cathode reels in the following manner.

a. Remove a single flat head machine screw holding the bottom cover in position.

b. It will be noted that the three terminal studs on the cathode socket have been marked "C", "S" and "L".

c. Wire the three cathode reels, (See Section 4, Paragraph 10G.) to similarly marked socket studs.

d. Replace the socket protective cover and small flat head machine screw.

e. Secure the cathode reel connecting wires to the cathode porcelain supporting insulator, Item 5, Fig. C-5654.

f. Insert the cathode socket into the tube base.

Note - The cathode socket is of the polarized type. It is therefore essential that the cathode pins and cathode socket be properly aligned before insertion of the cathode socket is attempted.

12. Fluoroscopic Screen.

The fluoroscopic screen, Item 11, Fig. C-5657 is assembled in the following manner. Ref. Assembly Dwg. C-5653.

a. Place the micarta screen protective panel, Item 7, the screen backing, Item 9, the fluoroscopic screen, Item 10 and the lead glass, Item 11, as shown in Fig. C-5653.

b. Place the four wooden shim strips about the edges of the screen unit as assembled in Paragraph 12-A.

c. The screen retaining frame, Item 12, Fig. C-5653 should be placed with the holes for the screen retaining locks in an upward position.

d. The screen retaining strips, Items 2 and 5, Fig. C-5653 should be removed.

e. Remove the screen handles, Items 3 and 4, Fig. C-5653.

f. With the screen retaining frame, Item 12, in the position outlined in Paragraph 12-C, insert the screen unit so that the lead glass is in an upward position. It may be necessary to shave the the small wooden shims, Item 8, to provide a tight fit. (Ref. Fig. C-5653.)

g. Replace the screen handles, Items 3 and 4, Fig. C-5653.

h. Replace the screen retaining strips, Items 2 and 5, Fig. C-5653.

i. Insert the fluoroscopic screen into its retaining fork.

Note - The screen retaining locks, Item 7, Fig. C-5657 should be raised and twisted so that they permit insertion of the screen. After the screen is placed in position with the lead glass upward as shown by Item 11, Fig. C-5657, secure the screen retaining locks, Item 7, Fig. C-5657.

It is recommended that the table be placed in a horizontal position while the screen is inserted. The fluoroscopic tower will be properly counterbalanced when the fluoroscopic screen is installed.

Caution - The fluoroscopic screen should never be removed from the screen fork without first setting the fluoroscopic tower to the head end of the table, and locking it into position. Failure to observe this precautionary measure may result in a broken horizontal carriage.

13. Table Top Assembly.

Place the table top in position. It should be noted that the underside of the table top is marked "Top". This end of the table top is placed towards the head end of the table. (Narrow end of the Table.)

a. Place the angle strips, Item 2, Fig. C-5657 in position as shown in Fig. C-5657. The strips should be checked for alignment of holes before any attempt is made to secure them.

b. Secure the table top by means of the Phillips screws provided.

c. Secure the angle strips by means of the Phillips screws provided.

d. Secure the compression device rails, Item 3, Fig. C-5657 by means of special Phillips screws and rail spacers provided.

Section 5

Tubestand Assembly

The procedure outlined below should be strictly adhered to. The step by step method if completely followed will enable assembly of the tubestand in the most efficient and direct manner.

1. Lower Rail

The lower rail is provided with four tapped holes to enable attachment of the two center legs and two outer legs.

The legs are secured to the rail in the following manner

a. By means of 3/8 x 16 x 1 1/2 bolts secure the center legs to the lower rail.

b. Secure the left leg to the lower rail by means of a 1/2 x 13 x 2 in. bolt.

Note - Lockwashers should be used to secure all bolts.

2. Upper Rail

The upper rail with the horizontal and vertical scales is mounted so that the scales may be read from the front of the table.

With the upper rail in this position the 52 inch scale will towards the head (narrow) end of the table.

a. Secure the upper rail to the center legs. Use 3/8 x 16 x 1 1/4 in. bolts.

b. Secure the left leg to the upper rail. Use 1/2 x 13 x 2 in. bolts. Before placing the upper rail into the retaining boss on the left leg, slide the circular rubber bumper over the rail.

Note - Lockwashers should secure all bolts.

3. Horizontal Carriage

The horizontal carriage, item 12, fig. C-5655, is placed into position on the top rail before the right leg is assembled to the rails.

a. The horizontal carriage lock, item 11, fig. C-5655 is released as far as it will go.

b. The carriage is inserted so that the roller bearings engage the top rail. The carriage lock, item 11, fig. C-5655 is securely locked once the carriage is properly inserted.

c. Secure the right leg to the lower rail. Use a 1/2 x 13 x 2 in. bolt.

d. Slip the rubber bumper over the top rail as shown in fig. C-5655.

e. Secure the right leg to the upper rail. Use a 1/2 x 13 x 2 in. bolt.

Note - Secure all bolts with lockwashers.

Caution - When placing the horizontal carriage in position over the top rail make certain that the small "Horizontal" nameplate points towards the 52 inch scale on the top rail.

4. Tubestand Column

The horizontal carriage is provided with a split clamp to enable attachment of the tubestand column to the railmount assembly.

The two machine screws, as well as the split clamp should be removed before any attempt is made to mount the column into position.

a. Secure the lower bearing, item 16, fig. C-5655 to the bottom of the tubestand column.

b. Make certain that the lower bearing is in line with the counterweight chain before attempting to place it over the lower rail.

c. Place a piece of 10 inch 2 x 4 approximately 15 inches from the right leg. The 2 x 4 should be set with its four inch dimension upwards. The purpose of this block is to provide a means of removing any possible overload to the lower bearing.

d. Carry the tubestand column over to the railmount.

e. Place the column so that the lower section rests on the 2 x 4 block.

f. Raise the column, and slide the lower bearing over the lower rail.

Caution - Do not permit the lower bearing to support the weight of the entire column. Failure to observe this precautionary measure may result in a broken lower bearing.

g. Place the 2 x 4 under the lower end of the column after the lower bearing is positioned.

h. Replace the split clamps and secure the tubestand column to the horizontal carriage.

i. Adjust the height of the column with respect to the horizontal carriage so that the tactile indicator is properly positioned.

j. Rotate the lower bearing slightly, if necessary, to take up any possible play between the column and lower rail.

5. Tube arm

The tube arm is attached to the tubestand column after the operations outlined in step 4 have been performed.

a. Remove the machine screw holding the tubestand counterweights in their shipping position.

b. Note that the tube arm angulating lock pin is attached to the tube arm.

Remove the lock pin and position it within the tube arm retaining boss.

c. Secure the tube arm retaining bolt after inserting the tube arm into position.

Note - To facilitate addition of the tube arm it is recommended that the vertical tubestand carriage be lowered to a convenient working height.

Since the tubestand vertical carriage has no tube arm, it is in an unbalanced condition. Therefore the vertical carriage should be securely locked in position before an attempt is made to insert the tube arm.

After assembly of the tube arm it is necessary that the carriage be left securely locked until the radiographic tube is permanently mounted on the tube arm.

6. Alignment

The method of alignment listed below should be carefully followed before any attempt is made to secure the tubestand to the floor.

a. Tie a piece of heavy twine between the two tube adaptor plate retaining nuts, item 8, fig. C-5655. It is recommended that the twine be wound around the studs into which item 8 is secured.

b. Adjust the height of the tube arm to be approximately 20 inches from the table top. To do this unlock the vertical carriage lock, at the same time holding the tube arm securely. Move the vertical carriage until the distance recommended above is obtained.

c. Carefully measure the inner-diameter of the tube retaining casting.

d. Mark the center of the twine by means of a pencil.

e. Secure a plumb from this point and adjust its height so that it is approximately 1/8 inch from the table top.

f. Make certain that table undercarriage is in the desired position before proceeding any further.

g. Adjust the table so that it is in a horizontal position.

h. Check the table for levelling by means of a level. Adjust the levelling pads if necessary.

i. Adjust the fluoroscopic tower so that its center-line indicator is opposite 27 on the bucky scale.

j. Carefully mark the center of the fluoroscopic screen glass by removing the screen from the screen fork and placing a straight edge diagonally across the screen assembly. It will be found useful to use some sort of colored chalk in marking this center line.

Note - The center line is marked on the glass.

k. Lock the tower into position at the "27" index point.

l. Operate the screen and fork rotation safety lock, item 12, fig. C-5657.

m. Operate the rotation safety lock and the screen-fork rotation lock, item 8, fig. C-5657 backwards and swing the screen-fork assembly to the left.

n. Turn the screen rotation lock and swing the screen so that it becomes perpendicular to the table top.

o. Swing the screen-fork assembly to the left until it is parallel with the fluoroscopic tower unit.

This enables the plumb to be moved along the length of the table and check parallelism between table and tube-stand.

p. Set the tube arm horizontal carriage so that its center line is opposite zero on the horizontal stereo scale.

q. Secure the tube arm horizontal carriage in this position.

r. Release the tubestand horizontal carriage lock and run the tubestand up and down along the railmount; check for alignment between the plumb and the longitudinal line on the table top.

s. Adjust the railmount until it is parallel with the table center line.

t. Run the tubestand to the foot end of the table.

u. With the horizontal carriage locked at the "27" index return the screen fork assembly to its normal position as shown in fig. C-5657.

v. Raise the tubestand vertical carriage to its uppermost position.

w. Move the tubestand so that the plumb is in the exact center of the fluoroscopic screen. It may be necessary to either lower the fluoroscopic screen or tubestand vertical carriage in order to bring the plumb approximately 1/8 inch from the screen lead glass.

Caution - If the screen assembly is lowered make certain that the fluoroscopic tower center line indicator is not disturbed from its previous setting.

x. With the plumb directly above the screen center reference the horizontal scale index as indicated by the left end of the tubestand horizontal carriage should coincide with the "27" bucky scale index.

z. If necessary adjust the railmount until these readings coincide.

If the railmount is moved repeat steps R and S of this paragraph.

Fixation of Railmount To Floor

The railmount may be secured to the floor once steps A to Z in paragraph 6 have been completed.

The railmount may be fixed to a concrete floor in the following manner.

a. By means of a "star drill", drill 8, 7/16 inch holes 1 3/4 inches deep.

In drilling the 8 mounting holes care should be taken not to move the railmount.

b. After drilling 8 mounting holes insert 8 special rawl plugs.

c. Lightly drive the rawl plugs until they reach the bottom of the mounting holes.

d. Insert a special 2 1/2 inch lag screw, provided with its proper washer, in each mounting hole.

e. Secure the railmount by tightening the 8 lag screws.

f. Check for table to tubestand alignment, as outlined in paragraph 6, after securing the railmount.

g. For fixation of the railmount to wooden floors proceed as follows:

h. Drill a 3/16 inch hole centrally within each mounting hole. Drill to a depth of approximately two inches.

i. Insert a special 2 1/2 inch lag screw, provided with its proper washer, in each mounting hole.

j. Secure the railmount by tightening the 8 lag screws.

k. Check for table to tubestand alignment, as outlined in paragraph 6, after securing the railmount.

Section 6

Assembly of High Tension Transformer

The S#979967, 200 ma, 110 KV, high tension transformer is provided with four high tension outlets. There are two outlets for the fluoroscopic tube and two for the radiographic tube.

The radiographic outlets are stamped "U"; the fluoroscopic outlets are stamped "L".

The high tension transformer is located between the center railmount legs as shown in fig. C-5645.

The cathode outlets should be so positioned that they normally lie towards the foot end of the table; ie. towards the right when viewing the transformer from the front of the table.

The cathode outlets are provided with a three prong socket while the anode outlets have a single prong socket.

After installing the valve tubes and connecting the transformer as outlined under "Assembly" in "Control Instructions" 57-853 proceed as follows.

a. Secure the anode and cathode cables to the bottom of the lower rail. Small clamps as well as tapped holes in the lower rail are provided.

The tapped holes are located about 12 inches from the left leg of the railmount.

b. Secure the fluoroscopic anode cable to the side of the transformer cover as shown in fig. C-5645.

c. Secure the cathode cable to the two center legs as shown in fig. C-5656.

d. Ground the table undercarriage to the transformer as shown by item 2, fig. C-5656.

A special hole has been provided on the rear leg of the undercarriage for purposes of adding a ground wire.

The special hole is located directly below the terminal box top panel, item 27, fig. C-5656.

e. Insert the fluoroscopic cathode cable, item 7, fig. C-5656 into the fluoroscopic cathode socket. Make certain that the cable is properly inserted before securing the lock nut.

f. Insert the fluoroscopic anode cable into the fluoroscopic anode socket.

g. Insert the radiographic anode cable, item 8, fig. C-5657, into the radiographic anode socket.

h. Insert the radiographic cathode cable, item 9, fig. C-5656 into the radiographic cathode socket.

i. Remove the roller retaining acorn nut, item 17, fig. C-5656 and the anode cable roller. Insert the anode cable into its tracks.

j. Replace the upper anode cable roller and acorn nut, item 17, fig. C-5656.

k. Remove the roller retaining acorn nut and cathode cable roller. Insert the cathode cable into its roller tracks.

l. Replace the upper cathode cable roller and acorn nut.

Section 7

Final Adjustments

1. Assembly of Shockproof Tubehead

a. Mount the shockproof radiographic tube on the tube adapting panel.

b. Mount the adapting panel on the tube arm horizontal carriage and secure it by means of two retaining nuts, item 8, fig. C-5655.

c. Apply vaseline to the anode cable tube insert, (two prong plug) after having thoroughly cleaned it with a lint free cloth and carbon tetrachloride.

d. Insert the anode cable into the shock-proof tubehead. It is recommended that the anode insert be worked back and forth several times in order to exclude all air from the tube anode socket.

e. Secure the anode cable to the shockproof tubehead by means of the cable nut.

f. Apply vaseline to the cathode cable tube insert, (three prong plug), after having thoroughly cleaned it with a lint free cloth and carbon tetrachloride.

g. Insert the cathode cable into the shockproof tube-head. It is recommended that the cathode insert be carefully worked back and forth several times in order to exclude all air from the tube cathode socket.

h. Secure the cathode cable to the shockproof tube-head by means of the cable nut.

Note - The tubestand horizontal carriage is now properly counterbalanced, and the precautionary measures regarding unbalance of the horizontal carriage need be adhered to only in cases where the shock-proof tube is removed.

2. Table High Tension System

Before applying high tension to the table flurosocopic tube it is essential that the following operations are performed.

a. Thoroughly clean the cathode reel insulators with lint free cloth and carbon tetrachloride.

b. Thoroughly clean the cathode reels with lint free cloth.

c. Thoroughly clean the cathode high tension inlet cable sheath with lint free cloth and carbon tetrachloride.

d. Thoroughly clean the anode high tension inlet cable sheath with lint free cloth and carbon tetrachloride.

e. Thoroughly clean the anode porcelain insulator with lint free cloth and carbon tetrachloride.

f. Make certain that both anode and cathode cable outer sheaths are properly grounded.

g. Make certain that the table undercarriage is properly grounded.

3. Fluoroscopic Tube

The fluoroscopic tube must be properly adjusted once it has been installed in the table. Adjustment of the tube is made in the following manner.

a. Turn on main line switch.

b. Turn both filament regulators to their extreme clockwise position.

c. Set the potential dials to 30 Kv.

d. Plug the eight prong female connector into rear table leg. (Ref. Section 3)

Note - Before turning on the control main "on", "off" switch make certain that the table to control interconnecting cable is connected as outlined in Section 3.

e. Plug the foot switch into the front table leg.

f. Adjust the table to its vertical position.

g. Operate the control main, "on", "off" switch.

h. Set the "Fluoroscopic-Radiographic" switch to its fluoroscopic position.

i. After taking all precautionary measures against x-rays and high tension operate the foot switch. Note the milliamperage. The 0-20 range of the milliammeter should be connected.

j. Adjust the milliamperage for 3 ma.

k. Remove foot from foot switch.

l. Raise kilovoltage to 50 KV.

m. All adjustments of the fluoroscopic tube should be made at 50 KV and 3 to 4 ma.

n. Close both fluoroscopic shutters until an image of approximately 2 x 2 inches forms on the screen.

o. If the image is above the center reference line on the fluoroscopic screen raise the flurosoopic tube slightly.

Caution - Always turn off the control main switch before attempting any adjustments of the fluoroscopic tube.

p. If the image is below the center reference line on the fluoroscopic screen lower the fluoroscopic tube slightly.

Note - In all cases of raising or lowering the fluoroscopic tube it will be necessary to loosen the fluoroscopic tube split clamps.

q. If the image is to the left of the center reference line on the fluoroscopic screen rotate the fluoroscopic tube slightly to the right.

r. If the image is to the right of the center reference line on the fluoroscopic screen rotate the fluoroscopic tube slightly to the left.

Note - Adjustment of the fluoroscopic tube should be made with the least possible time of application of high tension to the fluoroscopic tube. The safe tube ratings should never be exceeded.

s. Once the fluoroscopic tube has been adjusted replace the protective table bottom.

t. Remove the reference chalked center lines from the fluoroscopic screen lead glass.

Section 8

Operation

Warning - This x-ray equipment is dangerous to both patient and operator unless established safe factors are strictly observed. It is sold only by or on the prescription of a physician. Read your WESTINGHOUSE MANUAL OF DIRECTIONS AND WARNINGS ---- it has been written for the protection of yourself and your patients. If you have failed to receive a copy, notify our nearest office immediately.

X-Ray Tube Life

The Westinghouse Special Fluoradex generator has been provided with every practical facility for minimizing the possibility of incorrect electrical or mechanical operation. However, certain responsibilities, particularly those governing satisfactory x-ray tube life, still attach themselves to the individual operator. A thorough familiarity with permissible full-wave MILLIAMPERAGE, KILOVOLTAGE and Time ratings as outlined on the tube manufacturers chart is therefore of the utmost importance if economical and trouble free operation is to be expected.

After taking all necessary precautions against high voltage and exposure to x-rays, proceed as follows:

1. Fluoroscopic Operation

   a. Set the Operation selector to the Fluoroscopic Position.

   b. Set both potential dials to the desired kilovoltage. DO NOT EXCEED THE SMALL FOCAL SPOT VALUES SHOWN ON THE FLUOROSCOPIC TUBE RATING CHART FOR FULL WAVE OPERATION.

   c. Throw the control main switch to its "On" position.

   d. Adjust the Line Voltage regulator until the line voltmeter reads zero.

   e. Refer to the fluoroscopic calibration form at the end of the control instructions. Note: This calibration should be made, and filament preset and other values entered by the Westinghouse Service Representative at the time of installation. However, the low M.A. preset values shown on the preliminary radiographic form may be tentatively used, but with caution as a basis for preliminary fluoroscopic calibration.

   f. Preset the lower (fluoroscopic) filament regulator to the value shown on the fluoroscopic form for the

milliamperage selected. DO NOT EXCEED THE MAXIMUM SMALL FOCAL SPOT VALVES SHOWN ON THE FLUOROSCOPIC TUBE RATING CHART FOR FULL WAVE FLUOROSCOPIC OPERATION.

g. Step on the foot switch and observe the milliammeter (X-RAYS ARE NOW BEING GENERATED. The actual value in milliamperes should be indicated on the low (0-20) scale. If the milliammeter does not indicate the exact value selected, the fluoroscopic filament regulator may be adjusted while x-rays are on until the desired reading is obtained. After releasing the foot switch the no load, (x-rays off) filament meter reading for the indicated milliamperage should be recorded on the blank fluoroscopic calibration at the end of the control instructions for future reference.

Section 9

Service Notes

1. Main Table Bearings.

The main table bearings, Item 23, Fig. C-5657 should be periodically greased.

The table should always be adjusted to its horizontal position before any attempt is made to remove the split bearings and apply grease.

Caution - Never attempt to remove the split bearings with the table in a vertical position.

2. Fluoroscopic High Tension System.

The fluoroscopic high tension system should be periodically cleaned with lint free cloth and carbon tetrachloride.

The table protective bottom covering is removed and the following high tension components cleaned.

Note - Lint free cloth and clean, dry carbon tetrachloride should be used.

a. Clean the anode porcelain supporting insulator.

b. Clean the anode inlet high tension cable sheath.

c. Clean the cathode reel supporting insulators.

d. Clean the cathode inlet high tension cable sheath.

3. Fluoroscopic Screen.

The fluoroscopic screen, Item 11, Fig. C-5657 should under no conditions be exposed to sunlight.

Failure to observe this precautionary measure will seriously impair the relative brightness of the screen when used for fluoroscopic examinations.

The screen assembly should always be removed from the screen fork when the screen is likely to be exposed to sunlight.

4. Sparking Over Between The Anode Radiator And Rayproof Tubehead.

On dry crisp days occasional "pecking" may be heard within the table tub. Cause of this "pecking" may be due to a high accumulation of static charge on the anode end of the rayproof housing

which leaks off to the anode radiator.

This difficulty may be eliminated by placing a little glycerine along the top surface of the rayproof housing directly under the radiator.

It is important that medicinal glycerine be used for this purpose, and the glycerine be applied around the entire top of the rayproof housing.

5. Counterweight Cables.

The bucky and tower counterweight cables should be periodically inspected for wear.

The cables should be immediately replaced if any sign of "Fraying" is apparent.

6. Vertical Stereo Release.

The vertical stereo mechanism should be periodically inspected for operation.

If the horizontal stereo release is too rapid, the following tests should be made.

a. Remove one or more of the stereo counterweights, Item 11, Fig. C-5656.

b. "Cock" the stereo and then release it. If the stereo mechanism does not permit the tube arm to drop, lock the stereo lock mechanism, Item 13, Fig. C-5651.

c. Set the stereo selector, Item 4, Fig. C-5651 for a 7 inch stereo.

d. Raise the tube arm upward until it automatically locks.

e. Remove the stereo release mechanism oil cap, Item 6, Fig. C-5651.

f. Check the oil level. If a difficiency in oil is apparent, add enough oil to raise the level 1/8th of an inch.

g. Replace the oil cap, Item 6, Fig. C-5651.

h. Release the tube arm and check the rate of fall. A careful balance between counterweights, Item 11, Fig. C-5656 and oil level must be maintained to insure smooth and trouble free stereo operation.

1. Slow release in stereo shift, (vertical) may be due to insufficient counterweights, Item 11, Fig. 5656 or a proficiency in oil.

Caution - Always lock the stereo lock, Item 13, Fig. C-5651 and "Cock" the tube arm to its maximum stereo shift position before attempting to remove the oil cap, Item 6, Fig. C-5651.

7. Lower Bearing.

Play between the tubestand vertical column and the lower rail may be due to improper adjustment of the lower bearing.

The play may be eliminated by twisting the lower bearing slightly.

8. Drive Chain.

A small set screw is provided on the left side of the front undercarriage leg. The set screw is used to take up any slack that may occur in the drive chain through wear.

C. T. Zavales
Feb. 15, 1943

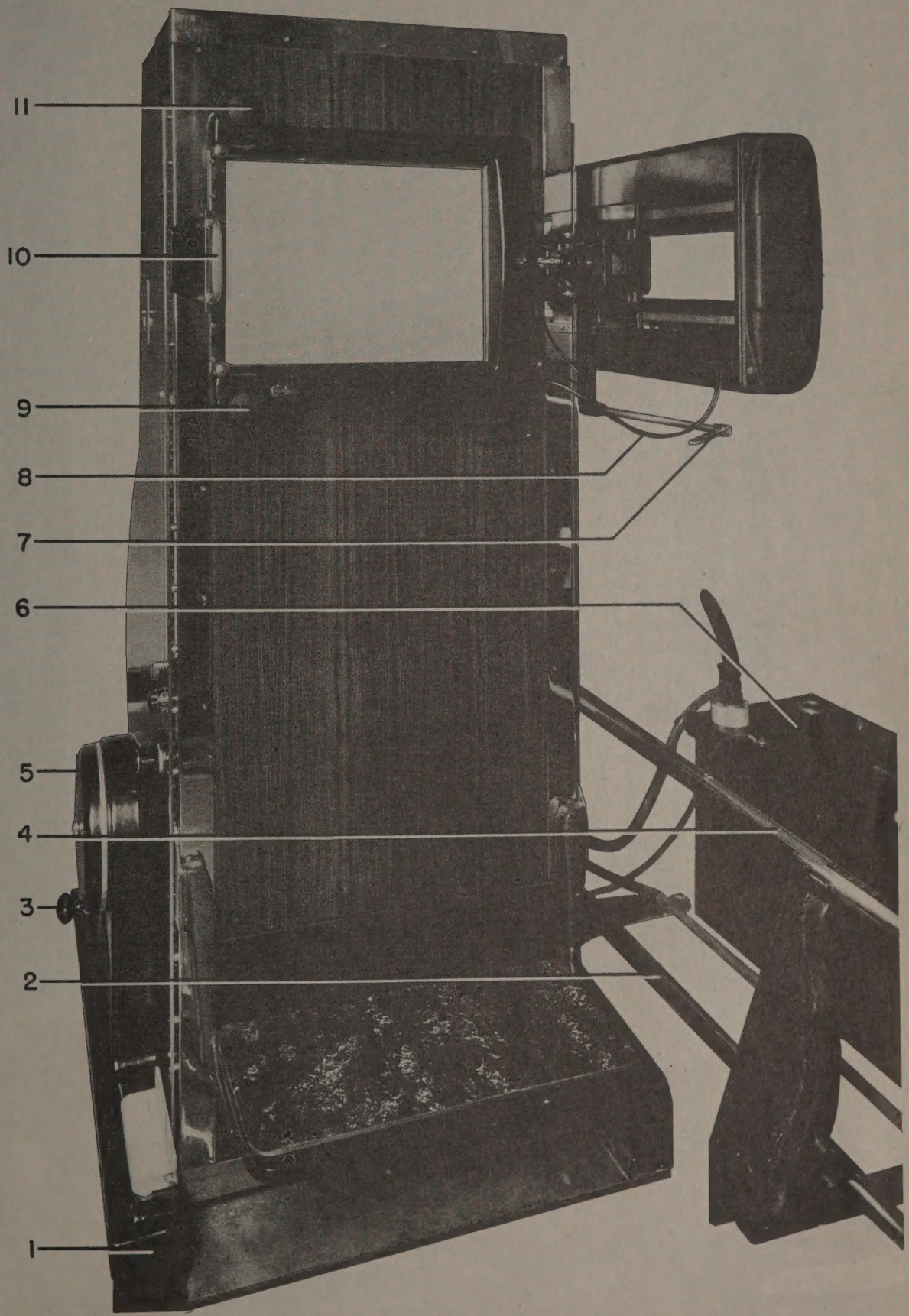


FIG. C-5645

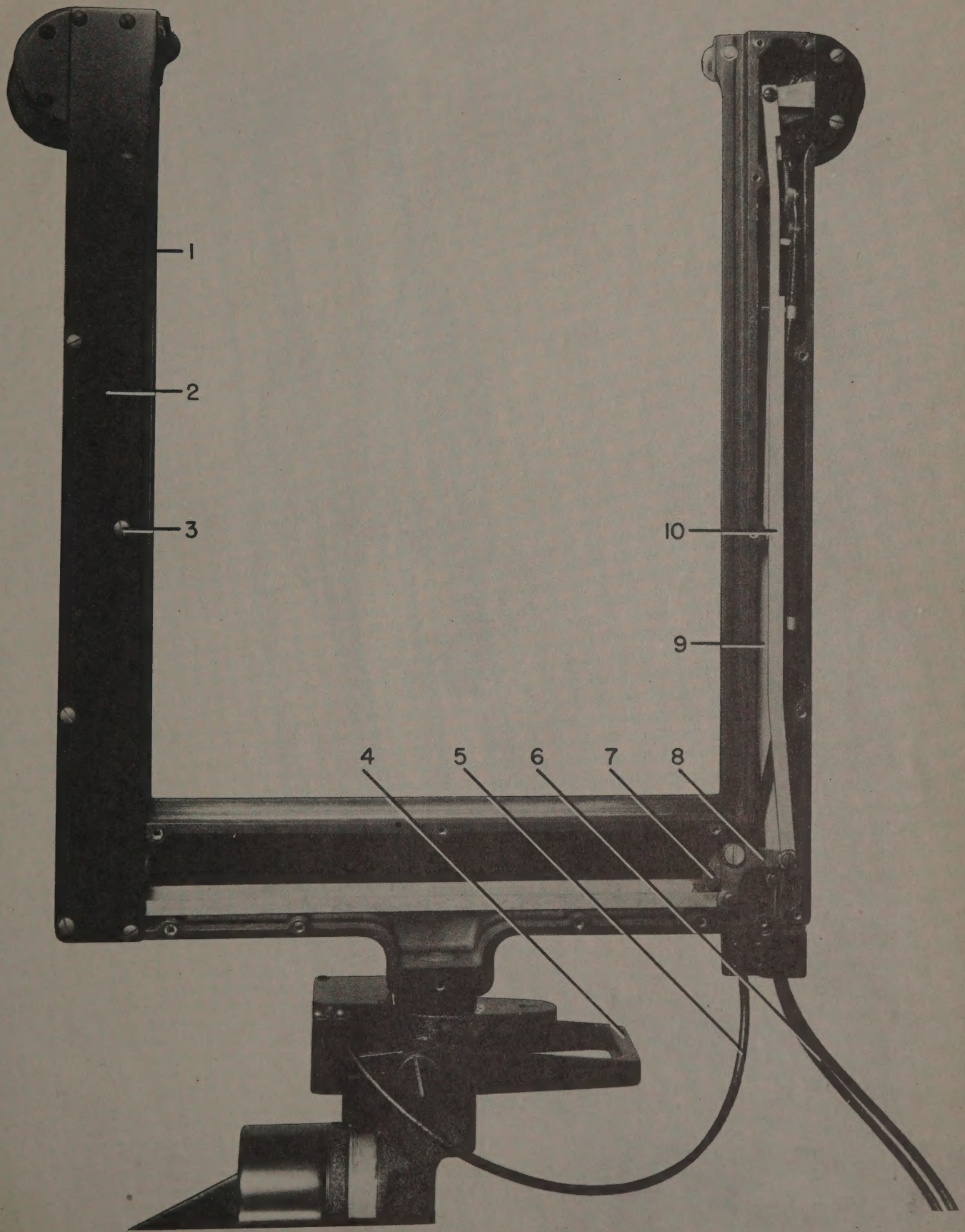


FIG. C-5646

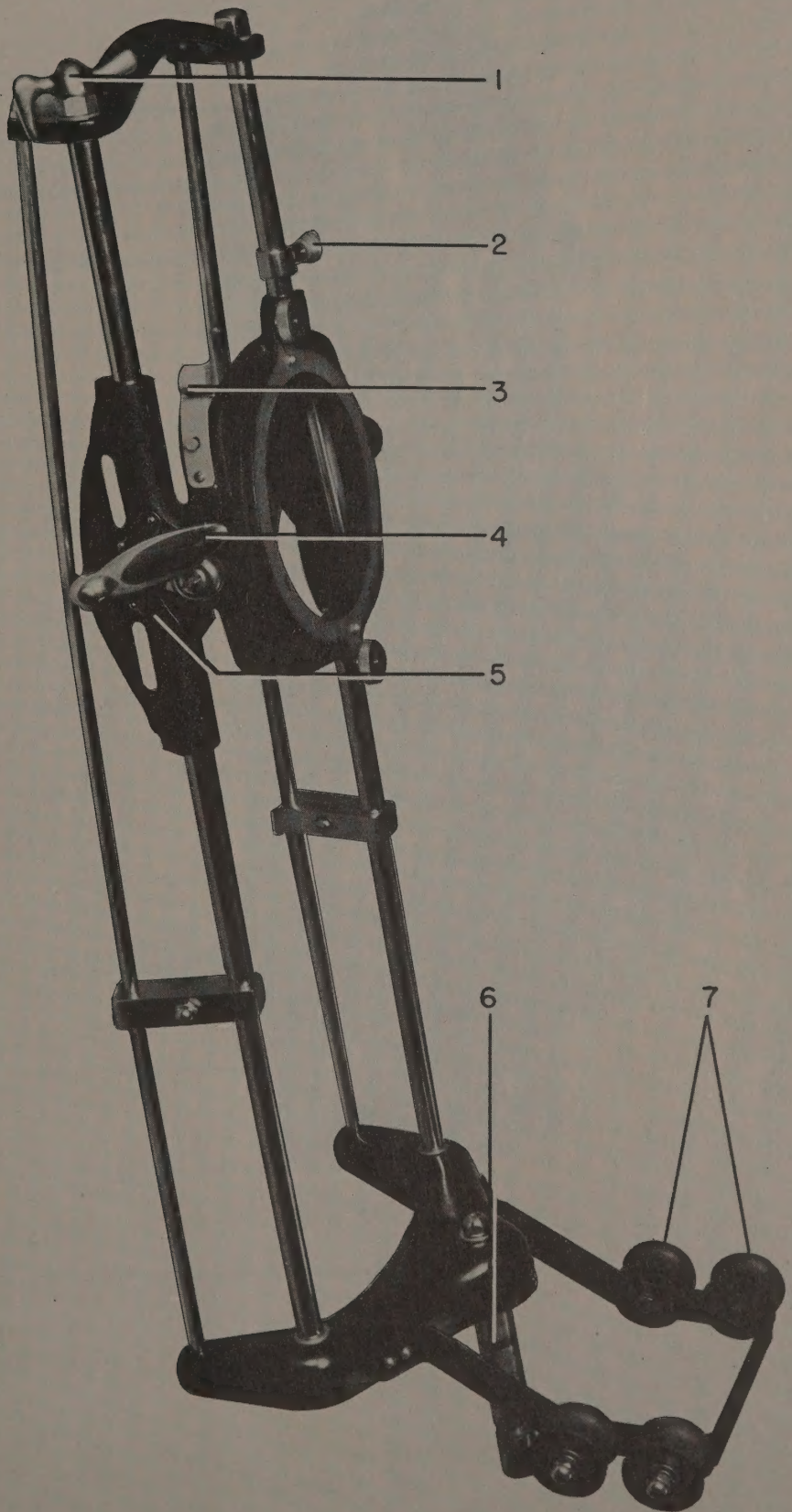


FIG. C-5648

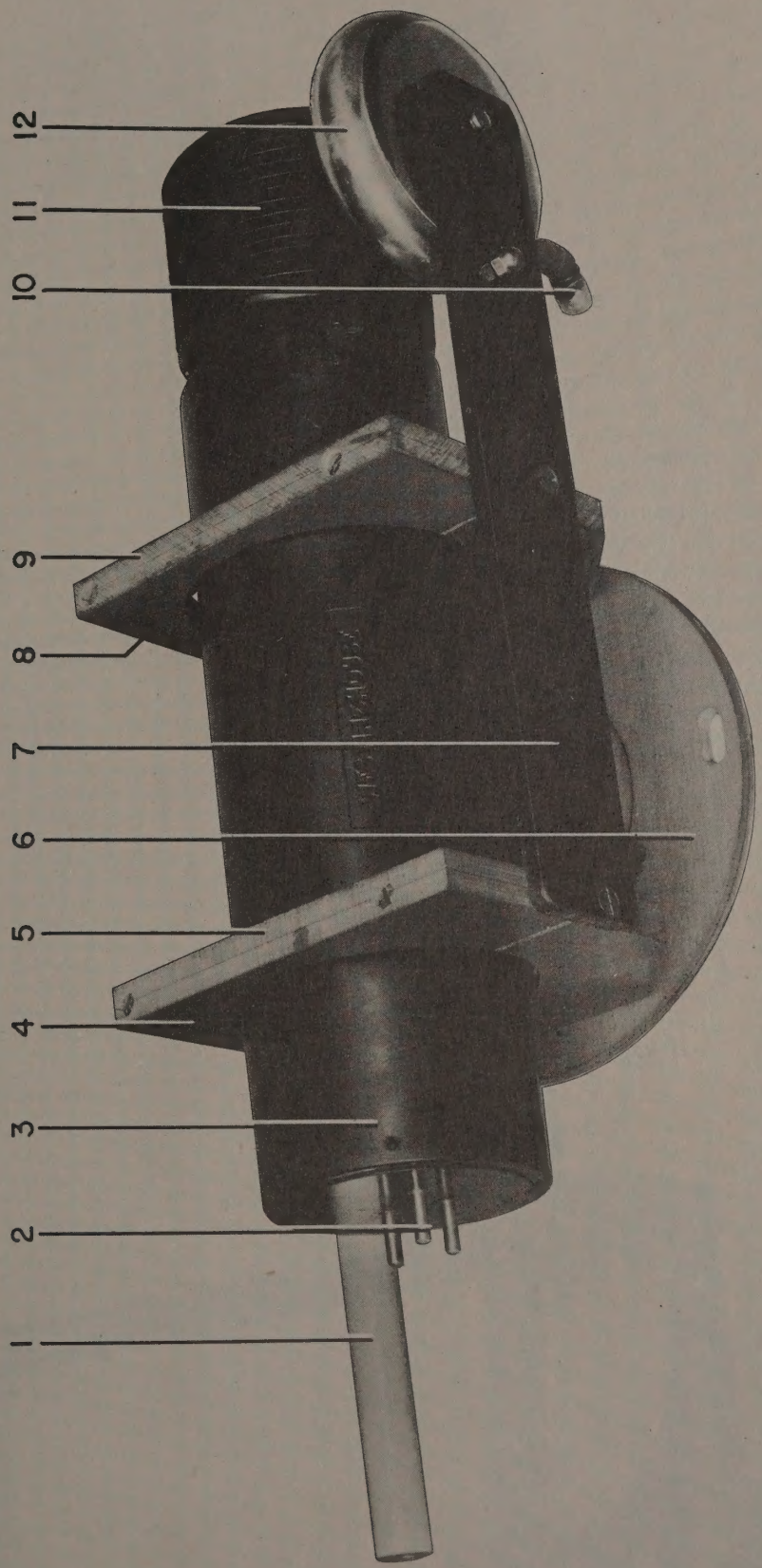


FIG. C-5649

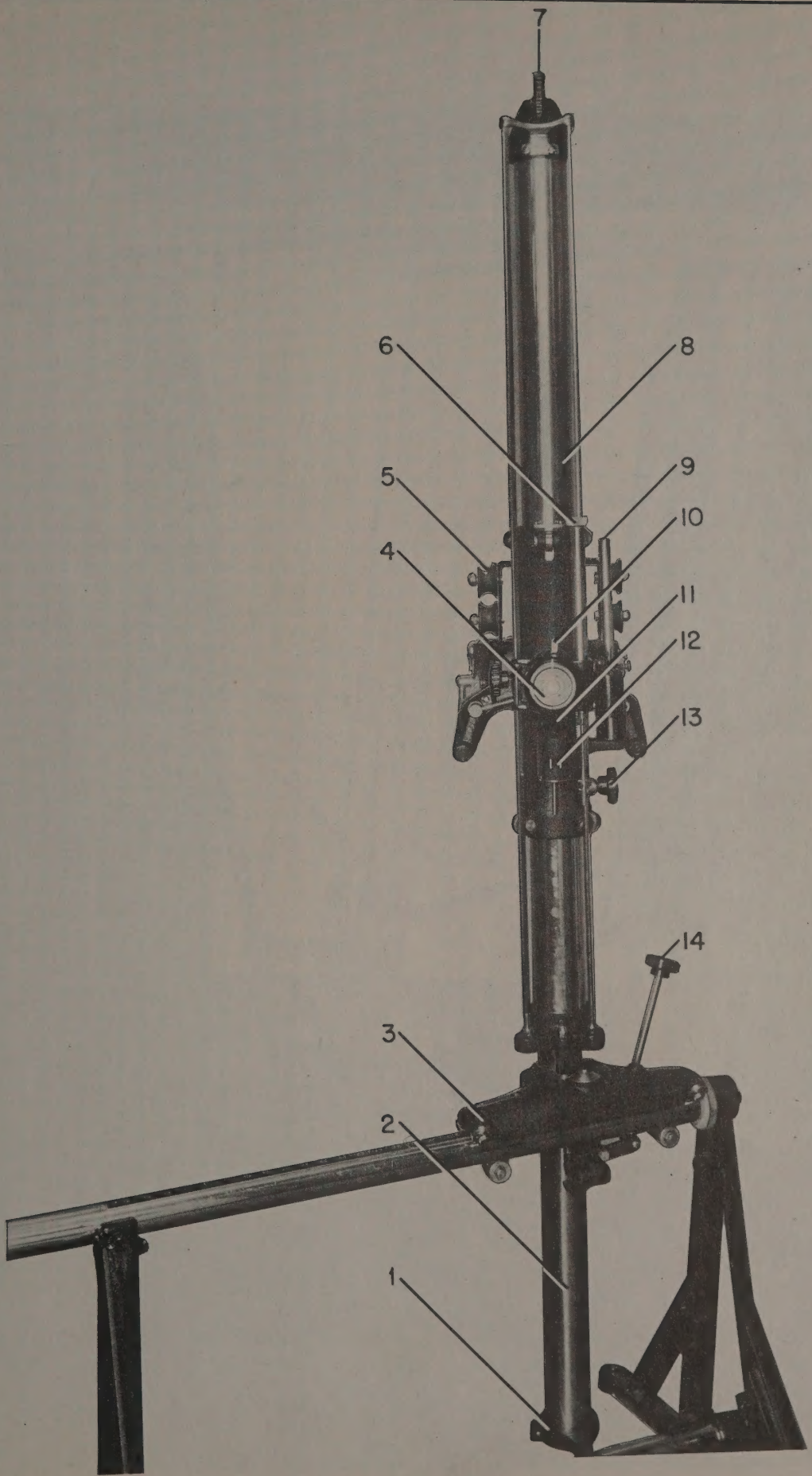


FIG. C-5651

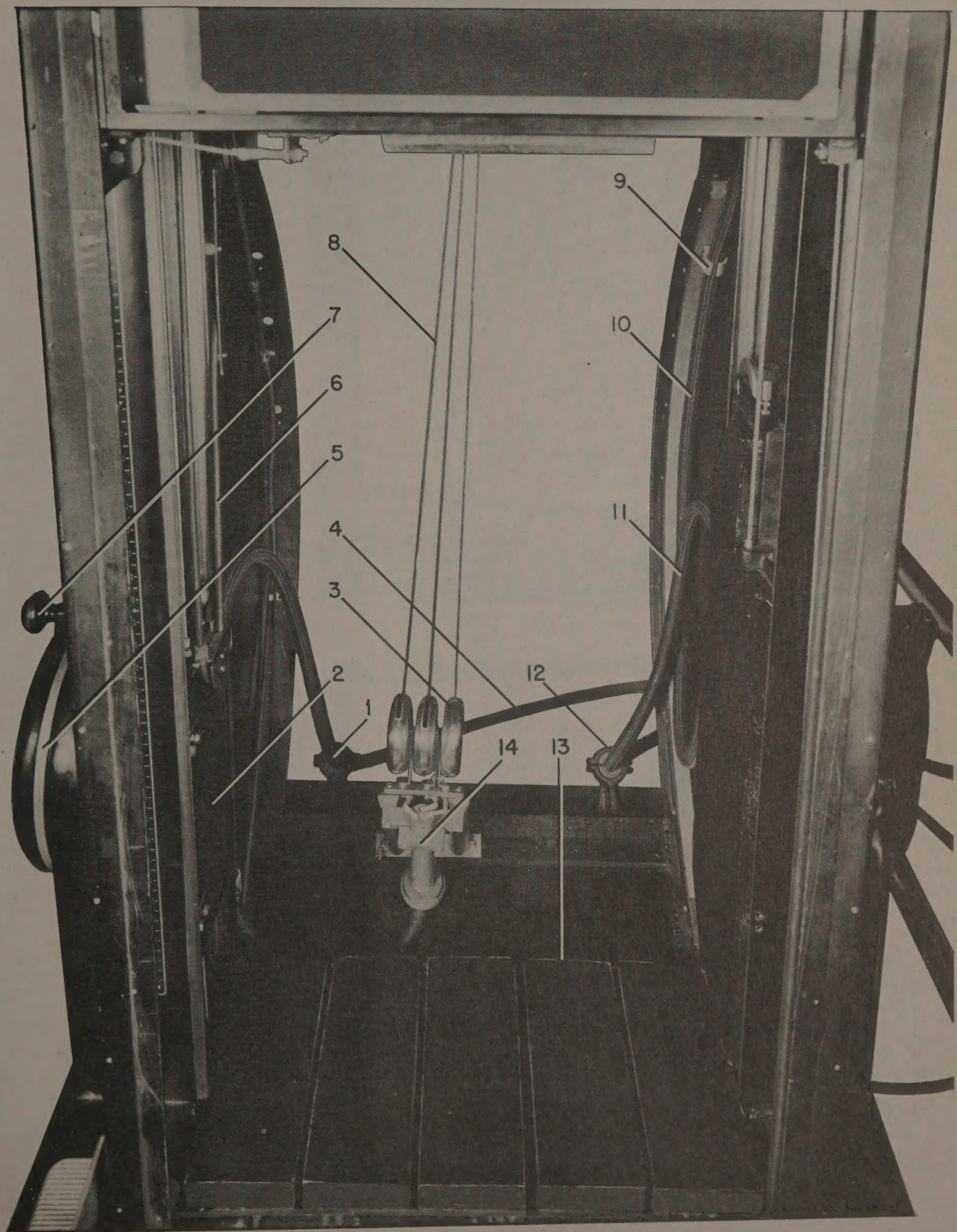


FIG. C-5652

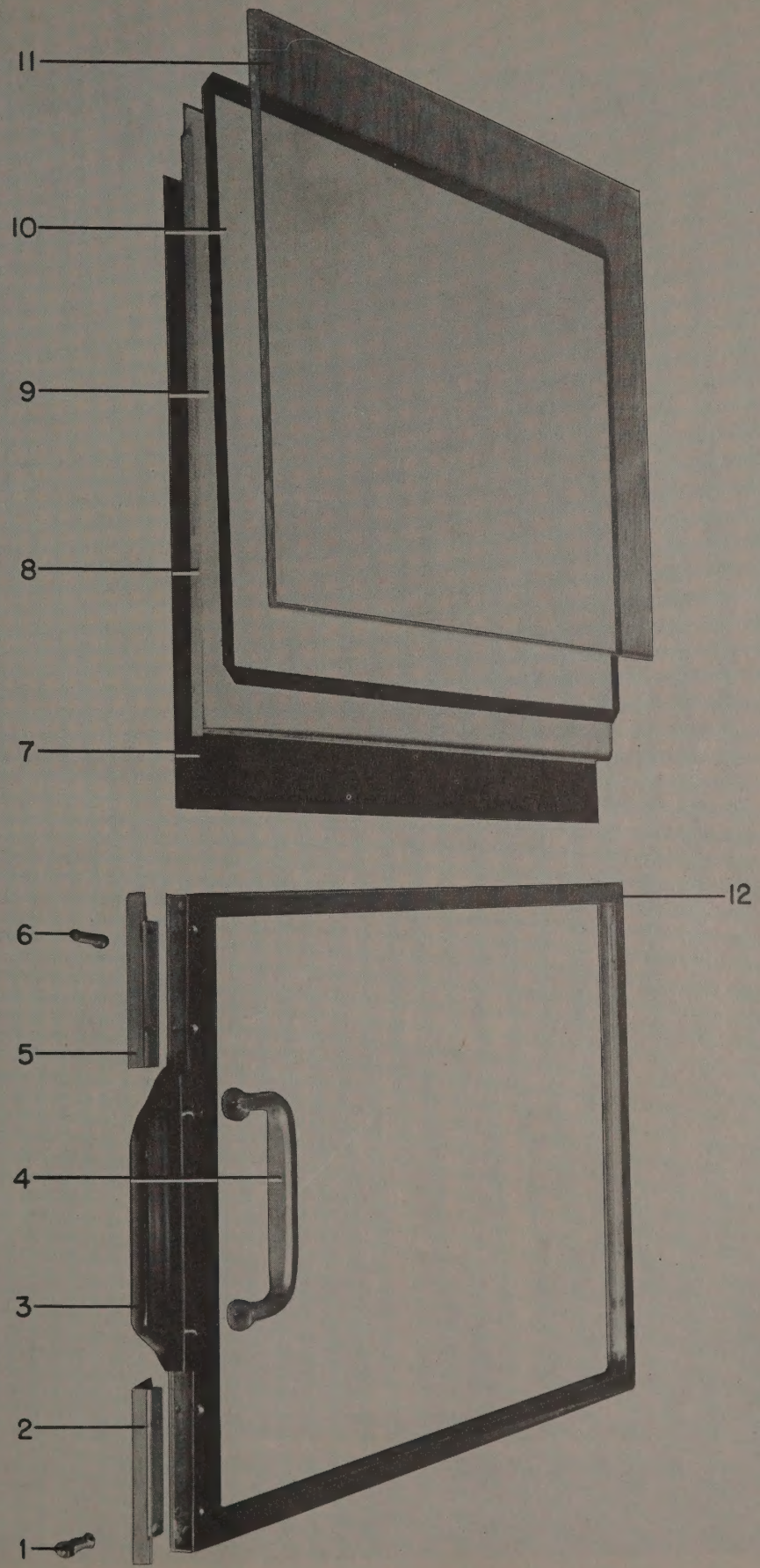


FIG. C-5653

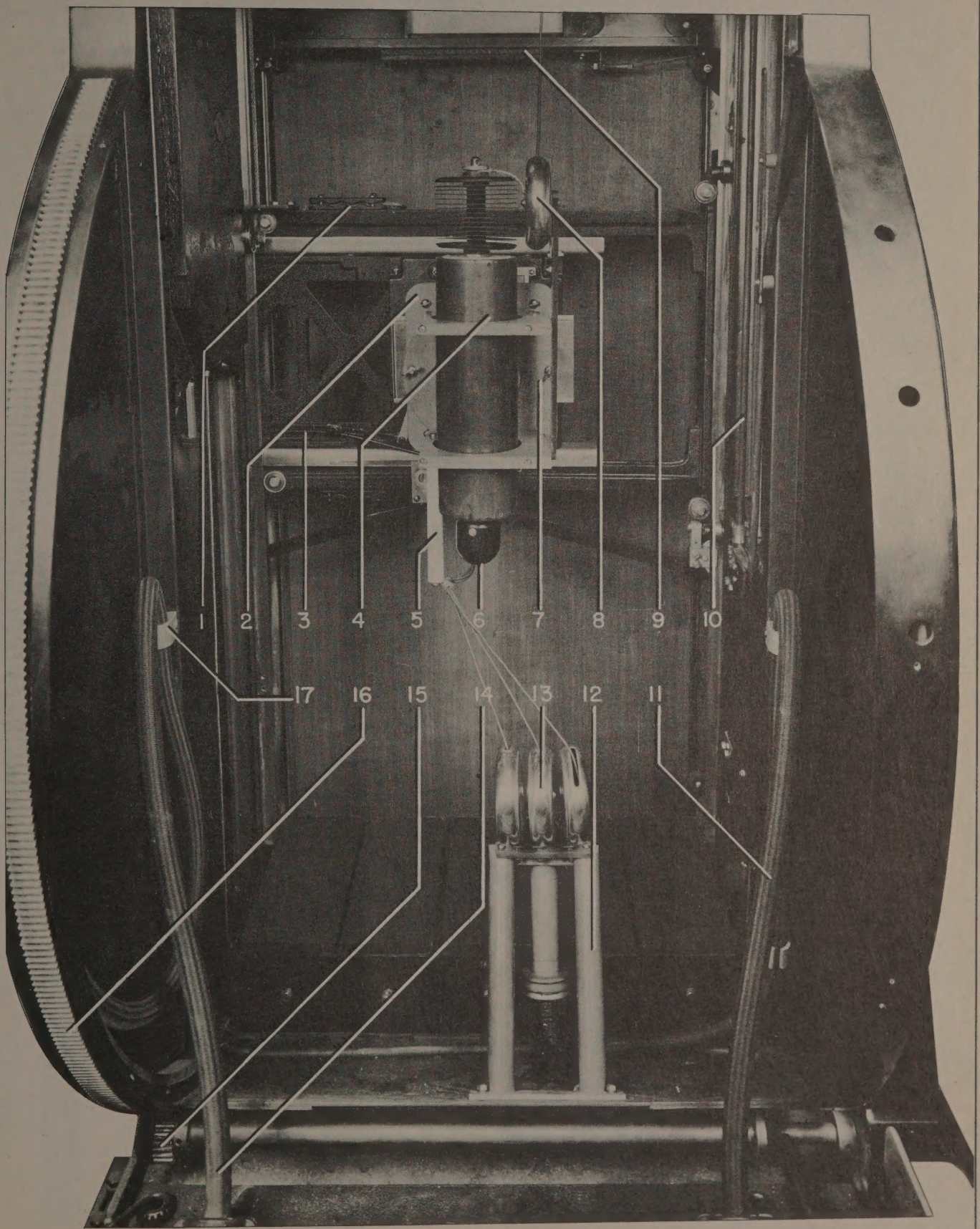


FIG. C-5654

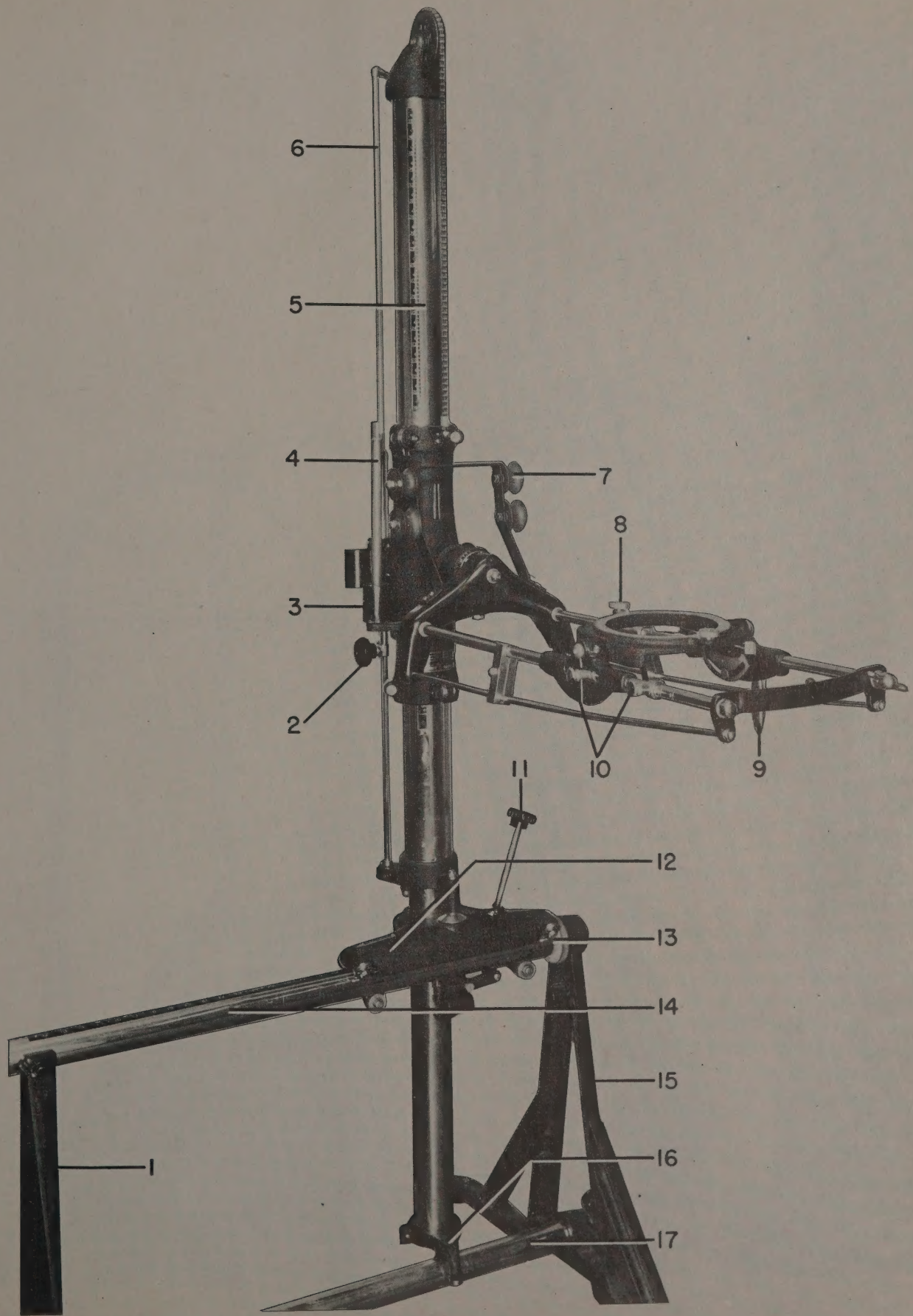


FIG. C-5655

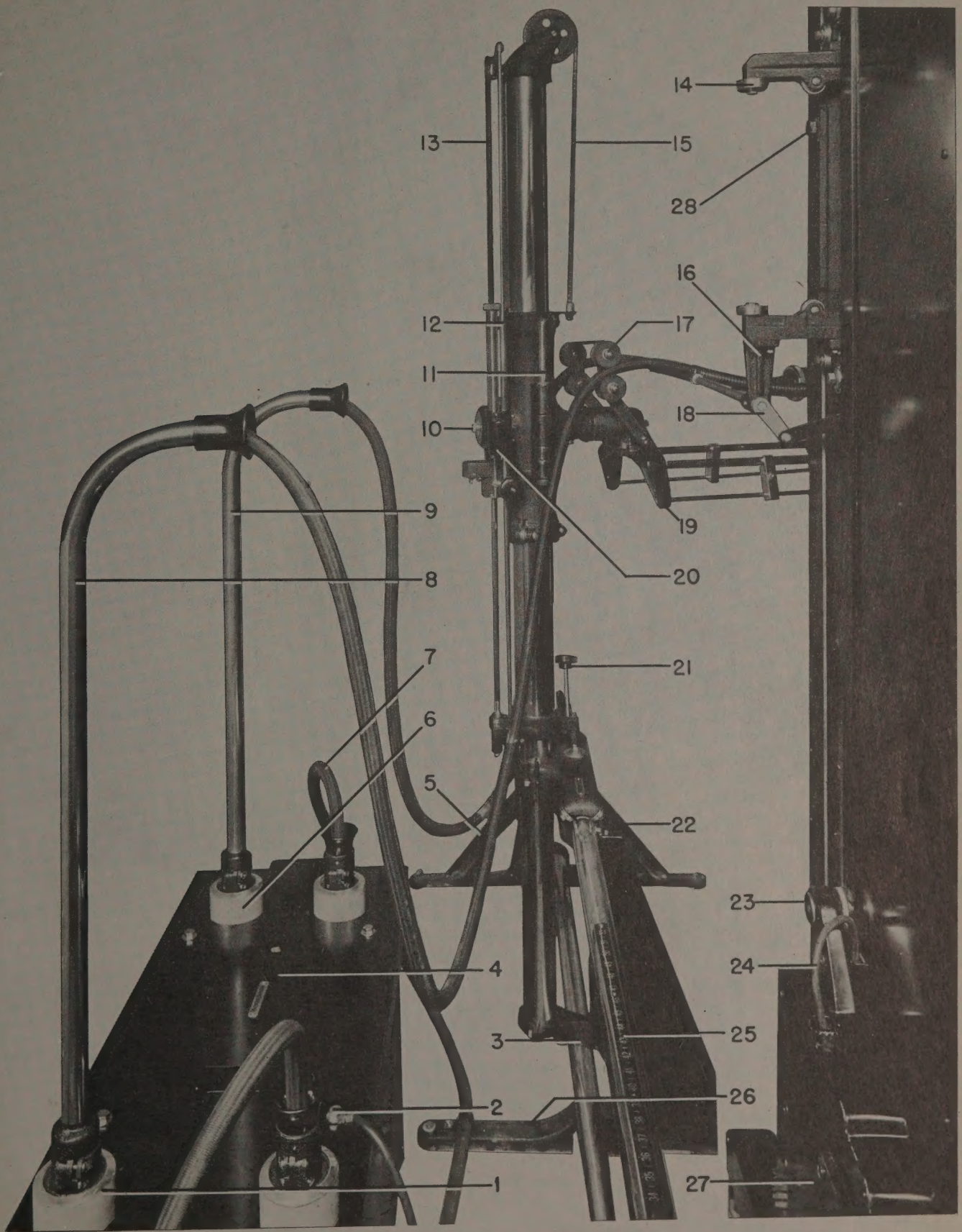


FIG. C-5656

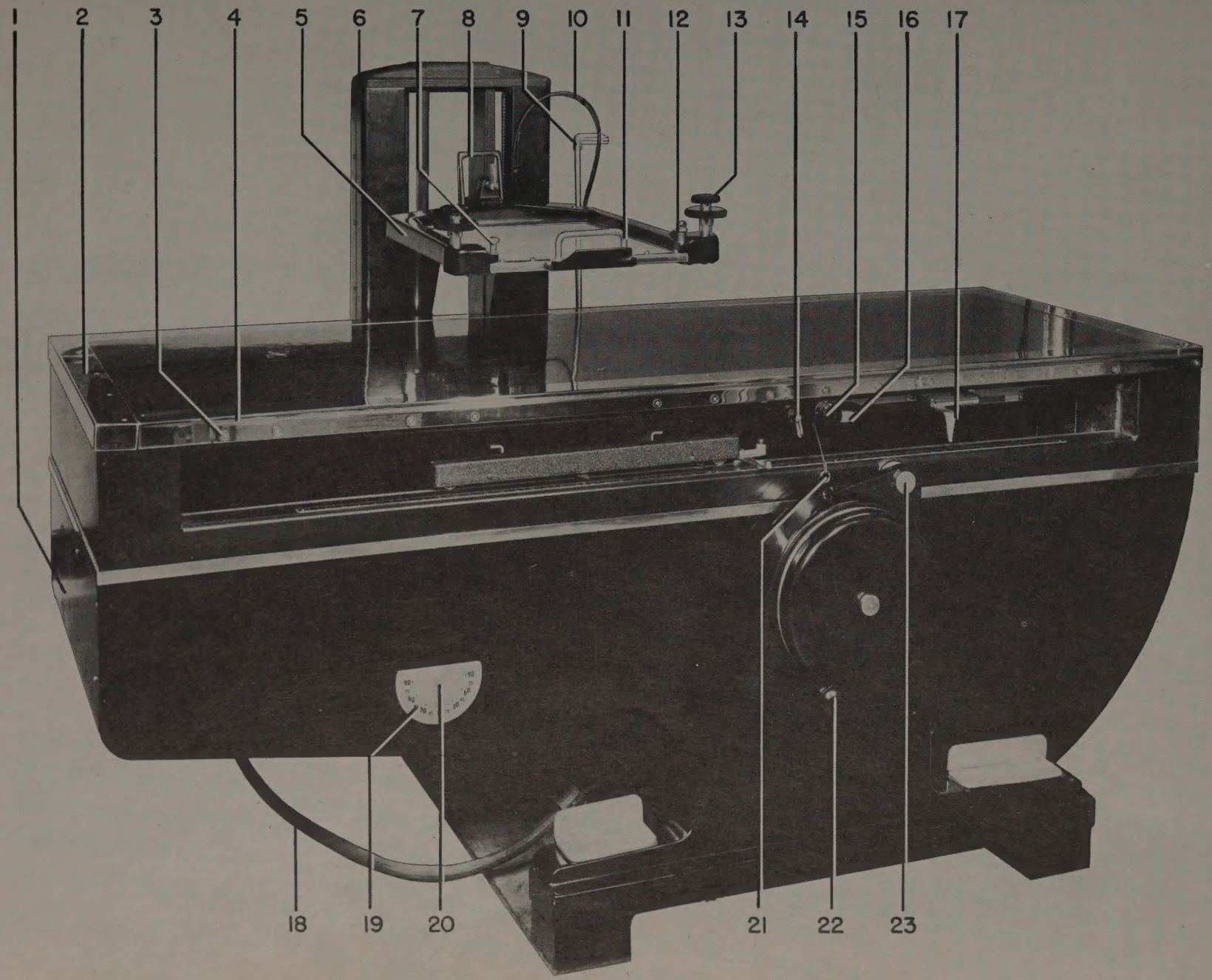


FIG. C-5657

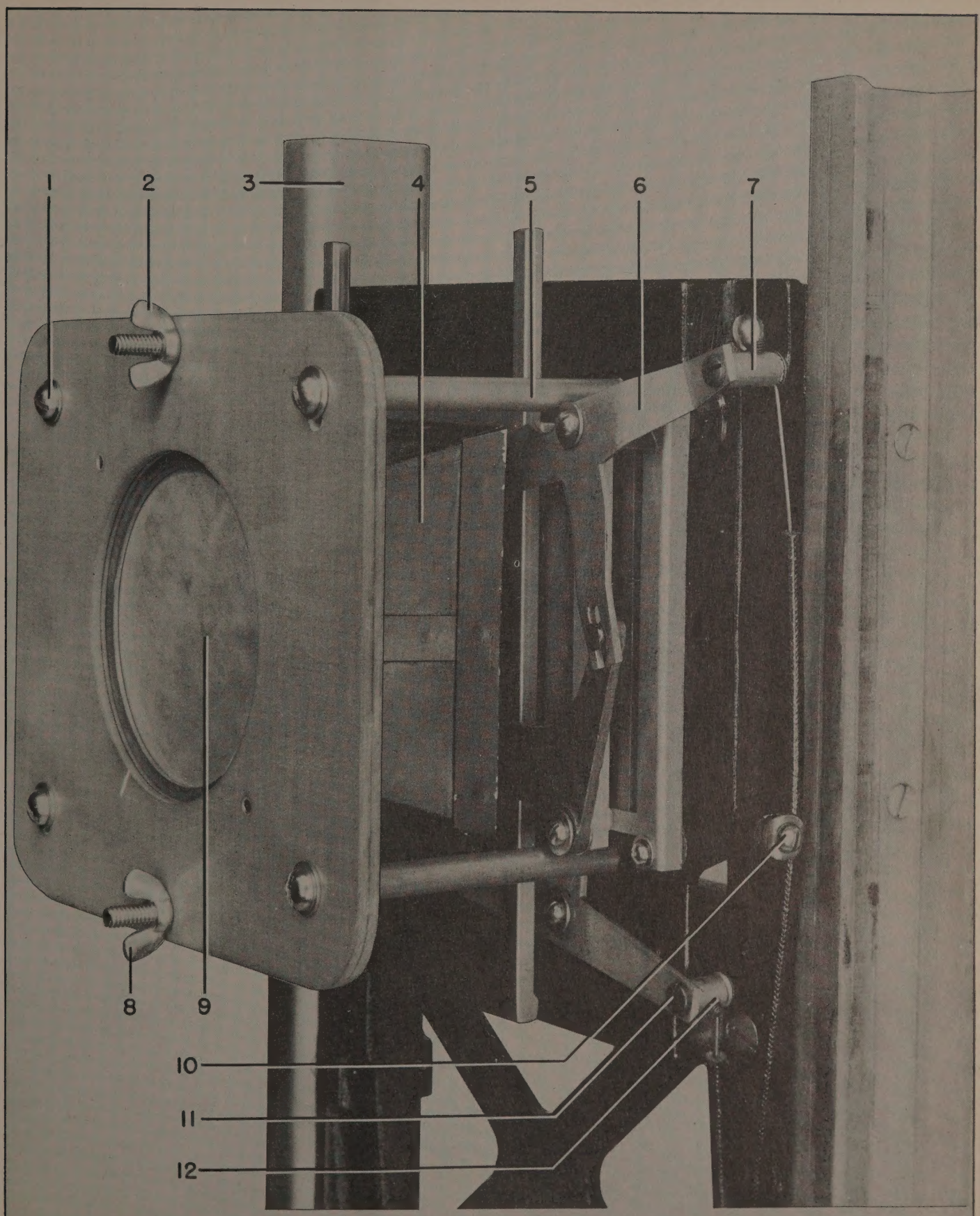
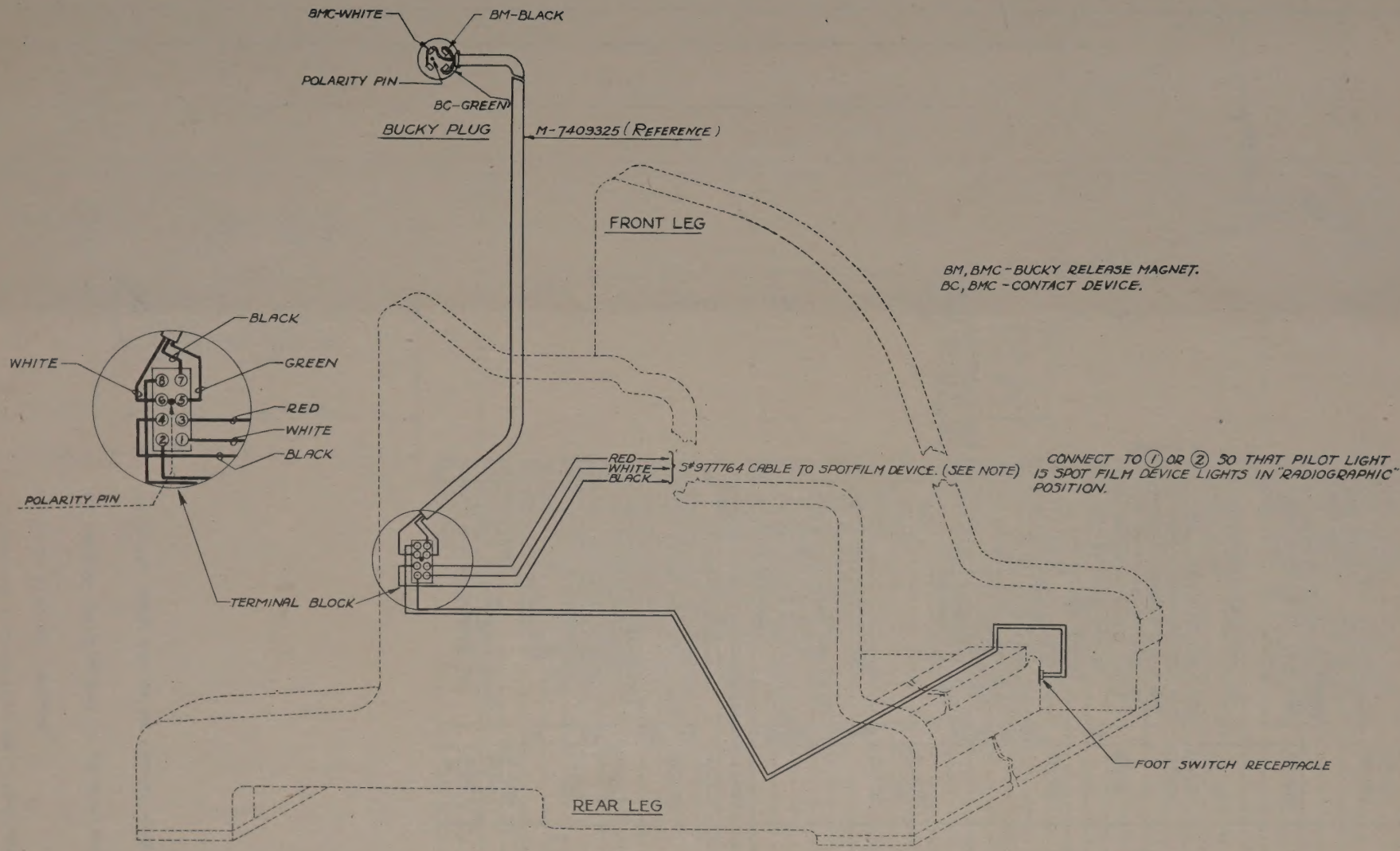


FIG. C-5658

1. Under carriage wiring diagram, Drawing #7709755.



REEL & PANEL STRIP ASSEMBLY NOTE
FOR DOUBLE REEL USE HOLES 1 & 2.
FOR ONE DOUBLE & ONE SINGLE REEL USE HOLES 1, 2, & 3.

Item	Description-Material-Ref. Dwg.	Fig. Sheet (Loc. No.)	Style No.	Pat. No.	Req.
1	SMALL CLAMP 2-D-5732		980861		5
2	REEL SUPPORT 5-D-2257		980863		2
3	REEL HOLDER 5-D-2598				
4	BASE PLATE 5-D-2597				
5	FLUO. TUBE 3HLD. & CORD REEL ASSEMBLY 3-A-1654				
6	CABLE CLAMPS IT.1 OF 75-C-582		980868		1
7	CORD REEL G2-7709816				3
8					
9	CABLE CLAMP IT.4 OF 75-C-582				
10	CABLE CLAMP		27-113		1
* 11	ANODE FLUOROSCOPIC CABLE - REF.		980097		
* 12	CATHODE FLUOROSCOPIC CABLE - REF.		980098		
⊙ 13	ANODE FLUOROSCOPIC CABLE - REF.				
⊙ 14	CATHODE FLUOROSCOPIC CABLE - REF.				
15	ISOLANTITE INSULATOR 42-C-577		980018		1
16	¼-20 X ½ HEX. HD. ST. MACH. SCR.	136 A			2
17	¼-I.D. LOCKWASHER. (STEEL)				2
18	SMALL CLAMP 2-D-5732		980862		5
19	¼-20 X 5/8 LG. BD. HD. ST. SCR.	172 A			1
20	.190-32 X 1" LG. FIL. HD. S. MACH. SCR.	133 A			2
21	.190-32 X 3/8 LG. FL. HD. S. MACH. SCR.	136 A			4
22	.190-32 X ½ LG. RD. HD. S. MACH. SCR.	135 A			2
23	.190-32 X 3/8 LG. BD. HD. S. MACH. SCR.	135 A			6
24	.190 INTERN. SHAKEPRF. ST. WASHER				5
25	SPACER		19-379		1
26	SPACER		15-628		1
27	WASHER		16-643		2
28	.164-32 X 3/8 LG. RD. S. MACH. SCR.	183 A			1
29	.164-32 HEX. ST. NUT	135 A			1
30	3" OF ½" WIDE, RUBBER TAPE #2622				1
31	.190-32 X 5/8 LG. BD. HD. SCR.	172 A			5
32	.190-32 X 3/4 LG. FIL. HD. ST. MACH. SCR.	136 A			2
33	190-32 BR. ACORN NUT.	139 A			3

DO NOT PRINT BELOW THIS LINE. IF NECESSARY, START NEW BILL OF MATERIAL ACCORDING TO THE DRAWING SYSTEM

DRAWING 3-A-1635 SUB-X 3

ITEM	DESCRIPTION-MATERIAL REF. DWG.		STYLE NO	PAT. NO	REQ.
34	¼-20 X ½ LG. RD. HD. S. MACH. SCR.	135 A			1
35	CABLE CLAMP IT. 3 75-C-582		980870		2
36	.190-32 HEX. ST. NUT	136 A			1
37	.190-I.D. LOCKWASHER (STEEL)				6
38	.190-I.D. PHOS. LOCKWASHER		570064		6
39	¼-20 X 3/4 LG. RD. HD. S. MACH. SCR.	135 A			1
40	¼-I.D. PHOS. BR. LOCKWASHER		570065		1
41	CORD CLAMP - K-7811702				
42	.190-32 X ¼ LG. BD. HD. S. SCR.	135 A			1
43	TUBE SOCKET		80-2686		1
44	BRYANT LAMP HOLDER 3-A-1114		979199		1
45	NO 8 PHOS. BR. LOCKWASHER		586189		3
46	WASHER		16-607		1

⊙ - ANODE CABLE, SIMILAR TO #980242 - SEE M#100337

⊙ - CATHODE CABLE, SIMILAR TO #980243 - SEE M.#100336

* - FLOOR MOUNTED TUBESTAND

FLUOROSCOPIC CONTIN CABLE ASSEMBLY = COMB # 9 OF 326793

2. Fluoroscopic Cable Assembly, Drawing 3A-1655.